## Annexure-I

## REASONED DOCUMENT ON COMMENTS/SUGGESTIONS RECEIVED ON DRAFT OF INDIAN RAILWAY STANDARD SPECIFICATION FOR SPHEROIDAL GRAPHITE CAST IRON INSERTS SERIAL NO. IRS/T-46(FOURTH REVISION)

Clau se no.	Existing Clause in IRS/T-46 Specification for SGCI Inserts	Proposed Modified Para/Clause of IRS/T-46 Specification for SGCI Inserts	Received from	Comm ents/S uggest ion	Discussion & reason for accepting/rejecting the suggestion	Final Modified Para/Clause of IRS/T-46 Specification for SGCI Inserts
	INDIAN RAILWAY STANDARDS SPECIFICATION FOR SPHEROIDAL GRAPHITE CAST IRON INSERTS SERIAL NO. T-46-2023 (THIRD REVISION- MAY 2023)	INDIAN RAILWAY STANDARDS SPECIFICATION FOR SPHEROIDAL GRAPHITE CAST IRON INSERTS SERIAL NO. T-46-2023 2024 (THIRD 4TH REVISION- MAY 2023 DEC 2024)	-	No comme nts	-	INDIAN RAILWAY STANDARDS SPECIFICATION FOR SPHEROIDAL GRAPHITE CAST IRON INSERTS SERIAL NO. T-46-2023 2025 (THIRD 4TH REVISION- MAY 2023 JANUARY 2025)
0.4	All Correction slips /Corrigendum (Corrigendum no. 1 to 3) issued till date have been incorporated in this revision.	All Correction slips /Corrigendum (Corrigendum no. 1 to 3) issued till date have been incorporated in this revision.	-	No comme nts	-	All Correction slips /Corrigendum (Corrigendum no. 1 to 3) issued till date have been incorporated in this revision.
1.1	This standard covers the manufactures, internal checking/testing and record keeping for quality assurance, offering material for inspection, testing and inspection and packing of spheroidal graphite Cast Iron Inserts for concrete sleepers hereinafter referred to as "Inserts". Contract awarding party has been referred to as "Purchaser" and its nominated inspection agency/representative as "Inspection Agency/Authority". The firm entrusted with manufacture and supply of inserts, is referred to as "Manufacturer".	This standard covers the manufactures, approval of samples, internal checking/testing and record keeping for quality assurance, offering material for inspection, testing and inspection and packing of Spheroidal Graphite Cast Iron Inserts for concrete sleepers hereinafter referred to as "Inserts". Contract awarding party has been referred to as "Purchaser" and its nominated inspection agency/representative as "Inspection Agency/Authority". The firm entrusted with manufacture and supply of inserts, is referred to as "Manufacturer".		No comme nts	-	This standard covers the manufactures, approval of samples, internal checking/testing and record keeping for quality assurance, offering material for inspection, testing and inspection and packing of Spheroidal Graphite Cast Iron Inserts for concrete sleepers hereinafter referred to as "Inserts". Contract awarding party has been referred to as "Purchaser" and its nominated inspection agency/representative as "Inspection Agency/Authority". The firm entrusted with manufacture and supply of inserts, is referred to as "Manufacturer".

New Para Adde d 1.2		"All the provisions contained RDSO's ISO procedures laid down in Document No:QO-D-8.1-11dated 20.11.2024 (titled "Vendor-Changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways."	- No - comme nts	"All the provisions contained RDSO's ISO procedures laid down in Document No:QO-D-8.1-11 dated 20.11.2024 (titled "Vendor-Changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways."
2.1	This standard refers to the following Indian Standard of BIS. These should be available at the manufacturer works for reference.  S. IS: N No.  IS:18 1 IS:18 65 Graphite – Specification Graphite – Specification Graphite – Specification (i) Determination of carbon volumetric method (for a carbon 0.05 to 2.5 perce (Pt.1) (3rd revision)  (ii) Determination of Manga in plain carbonand low a steels by arsenite method (Pt.2)  (iii) Determination of Silicor Gravimetric method Silicon greater than (Pt.8) equal to 0.1 percent)  (iv) IS:22 8 (Pt.3)  (v) Determination Phosphorus by alkalime method (Pt.3)  (v) Determination of Sulp in plain carbon steel evolution method.	IS:13 87 General requirements for the supply of Metallurgical materials (1st revision)  (i) Determination of carbon by IS:22 volumetric method (for a carbon 0.05 to 2.5 percent) (Pt.1) (3rd revision)  (ii) Determination of Manganese in plain carbonand low alloy steels by arsenite method.  (iii) Determination of Silicon by IS:22 Gravimetric method (For Silicon greater than or equal to 0.1 percent)  (iv) Determination of Phosphorus by alkalimetric method (Pt.3)  (v) Determination of Sulphur	- No comme nts	This standard refers to the following Indian Standard of BIS. These should be available at the manufacturer works for reference.  S. IS: No.  IS:18 IFON Castings with spheroidal or Nodular Graphite – Specification  IS:13 87 General requirements for the supply of Metallurgica materials (1st evision)  (i) Determination of carbon by IS:22 volumetric method (for carbon 0.05 to 2.5 percent (Pt.1) (3rd revision)  (ii) IS:22 8 (Pt.2)  (iii) Determination of Manganese in plain carbonand low alloy steels by arsenite method.  (iii) Determination of Silicon by IS:22 8 (Pt.2)  (iv) IS:22 8 (Pt.3)  (v) IS:22 8 (Pt.3)  Determination of Sulphur in plain carbon steel by evolution method.

	(vi) IS:22 8 (Pt.15 Thiosulphate Iodide Met.		Determination of Copper by Thiosulphate Iodide Method					(vi) IS:22 8 (Pt.15) Determination of Copper by Thiosulphate Iodide Method
	4 IS:15 Method of Brinell Hardness for metallic materical (2nd Revision).		Method of Brinell Hardness test for metallic materials. (2nd Revision).				4	IS:15 Method of Brinell Hardness test for metallic materials. (2nd Revision).
	IS:25 Sampling Inspection Table,Inspection Attributes & count defects (1st revision).	by 00 (Pt.I)	Sampling Inspection Table,Inspection by Attributes & count of defects (1st revision).				5	IS:25 Sampling Inspection Table,Inspection by Attributes & count of defects (1st revision).
	Code of practice IS:77 preparation 39 metallographic specin (Pt.V) Part V iron & Steel their examination.	nen6, 39 and (Pt.V)	Code of practice for preparation of metallographic specimen, Part V iron & Steel and their examination.				6	Code of practice for IS:77 preparation of metallographic specimen, (Pt.V) Part V iron & Steel and their examination.
	7 IS:16 Method of tensile testing steel products other the sheet, strip, wire and tules the sheet of the shee	hañ 18:16 oe 08	Method of tensile testing of steel products other than sheet, strip, wire and tube				7	IS:16 Method of tensile testing of steel products other than sheet, strip, wire and tube
	8 IS:77 Method for designation microstructure of graph in cast iron	hitæ   15:77 54	Method for designation of microstructure of graphite in cast iron				8	IS:77 54 Method for designation of microstructure of graphite in cast iron
	9 IS:83 Deviations for untoleren dimensions of Spheroida Nodular Graphite Castin	$\frac{1}{50} \frac{6}{50}$	Deviations for untolerenced dimensions of Spheroidal or Nodular Graphite Castings				9	IS:83 Deviations for untolerenced dimensions of Spheroidal or Nodular Graphite Castings
	1 ASTM Chemical Analysis of Chemical Types	for ASTM East E-351	Standard Test Methods for Chemical Analysis of Cast Iron—All Types				1 0	ASTM Standard Test Methods for Chemical Analysis of Cast Iron—All Types
7.00				M9-C	M9-C	Clause has been		
7.2.2	Sand mould shall be porous to allow fumes to escape out of the moulds when the molten metal is poured	fumes to- when the and entrap	ld shall be porous to allow escape out of the moulds molten metal is poured oped gases to escape out of s during pouring of molten	M&C Dte., RDSO	M&C Dte. has sugges ted for reword ing of clause 7.2.2.	Clause has been reworded as suggested by M&C Dte., RDSO	allo mo pot esc	nd mould shall be porous to by fumes to escape out of the ulds when the molten metal is ured and entrapped gases to cape out of the moulds during uring of molten metal.

New Para Adde d 8.1	The manufacturer shall make few trial castings with the aim of development of inserts. The castings shall be thoroughly checked for dimension, weight, metallurgical properties and chemical composition. If on examination, any change in pattern of gating, risers and runners, and method of moulding is found necessary, it shall be carried out. The same procedure shall be repeated till all aspects of manufacture technology get corrected.	-	No comme nts		The manufacturer shall make few trial castings with the aim of development of inserts. The castings shall be thoroughly checked for dimension, weight, metallurgical properties and chemical composition. If on examination, any change in pattern of gating, risers and runners, and method of moulding is found necessary, it shall be carried out. The same procedure shall be repeated till all aspects of manufacture technology get corrected.
New Para Adde d 8.2	When the procedure is perfected, the manufacturer shall issue call letter for visit of inspecting officer and sample inserts and test samples shall be made in the presence of inspecting officer. 8 inserts for dimensional checking and other samples and test pieces as instructed by inspecting officers shall be submitted to RDSO for testing. If the samples are found satisfactory dimensionally and metallurgically, the bulk manufacture of inserts shall be allowed. Inspection/testing charges for inspection of firm, checking of gauges, making and testing of samples etc. shall be borne by the manufacturers.	Prime Ispat Limited	SGCI insert of each drawin g will be inspect ed initiall y by RDSO and future inspect ion would be done by zonal Railwa y/RIT ES/TP I.	Initial quantity of 20000 inserts will be done by RDSO after approval.	When the procedure is perfected, the manufacturer shall issue call letter for visit of inspecting officer and sample inserts and test samples shall be made in the presence of inspecting officer. 8 inserts for dimensional checking and other samples and test pieces as instructed by inspecting officers shall be submitted to RDSO for testing. If the samples are found satisfactory dimensionally and metallurgically, the bulk manufacture of inserts shall be allowed. Inspection/testing charges for inspection of firm, checking of gauges, making and testing of samples etc. shall be borne by the manufacturers.

11	Tests as per Para <del>11</del> 12	Tests as per Para <del>11</del> 12 to 14	M&C	M&C	Clause has been	Tests as per Para <del>11</del> 12 to 14 shall
	to 14 shall be conducted	shall be conducted on SGCI	Dte.,	Dte.,	reworded as	be conducted on SGCI inserts for
	on SGCI inserts for	inserts for acceptance of the	RDSO	has	suggested by	acceptance of the material.
	acceptance of the	material.		sugges	M&C Dte.,	
	material.			ted for	RDSO	
				reword		
				ing of		
				this		
				clause.		
11.2.		<del>11.2.1</del> 12.2.1	M&C	M&C	In the third	<del>11.2.1</del> 12.2.1
1			Dte.,	Dte.,		
	Phosphorus content of one	Phosphorus content of one insert	RDSO	has		Phosphorus content of one insert from
				sugges		
				ted	,	
				that		
				Phosp	content was	
				horus	reduced from	
				conten	0.08% to 0.05%.	
				t shall		_ ***
				be		
				kept		
				<0.05		
				%		
					and tin & copper	
					was also added.	
					In the regular	
					_	
					-	
					*	
					meeting was held	
					on 16.01.2024	
					with the	
					manufacturers	
					content as 0.08%	
					and hardness of	
					190 BHN and	
					addition of tin &	
	Phosphorus content of one insert from each batch shall be checked and shall not exceed 0.05 per cent when tested in accordance with IS:228 (Part 3) – 1987 or when checked by spectrograph with the use of joint test lug of insert as per ASTM E-351.	Phosphorus content of one insert from each batch shall be checked and shall not exceed 0.05 0.08 per cent when tested in accordance with IS:228 (Part 3) – 1987 or when	Dte.,	Dte., has sugges ted that Phosp horus conten t shall be kept <0.05	revision of specification IRS/T-46 May-2023, phosphorus content was reduced from 0.08% to 0.05%, hardnes was increased from 170 to 241 BHN to Min 210 BHN and tin & copper was also added. In the regular production of inserts the above parameters could not be achieved. To discuss the above issue a meeting was held on 16.01.2024 with the manufacturers and M&C officials and it was decided to have phosphorus content as 0.08% and hardness of	Phosphorus content of one insert from each batch shall be checked and shall no exceed 0.08 per cent when tested in accordance with IS:228 (Part 3) – 1987 o when checked by spectrograph with the use of joint test lug of insert as per ASTM E-351

				copper was not to	
				be made	
				mandatory.	
				Hence, there is no	
				need to alter	
				phosphorus	
				content.	
				content.	
11.2.		12.2.2		_	12.2.2
2				_	
	Copper (Cu) content of one insert	12.2.2 Copper (Cu) content of one insert	No		12.2.2 Copper (Cu) content of one insert
	from each batch shall be checked	from each batch shall be checked and shall	comme		from each batch shall be checked and
	and shall be in the range of 0.10 to	be in the range of 0.10 to 0.30 percent	nts		shall be in the range of 0.10 to 0.30
	0.30 percent when tested in	when tested in accordance with IS: 228			percent when tested in accordance with
	accordance with IS: 228 (Part 15-	(Part 15 1992) or when checked by			IS: 228 (Part 15 1992) or when checked
	1992) or when checked by	spectrograph with the use of joint test lug of insert as per ASTM E-351.			by spectrograph with the use of joint test
	spectrograph with the use of joint test lug of insert as per ASTM E-351.	insert as per ASIM E-331.			lug of insert as per ASTM E-351.
	test lug of illsert as per ASTM E-331.				
11.2.		12.2.3		_	12,2,3
3				_	11.1.0
	Tin (Sn) content of one insert from	Tin (Sn) content of one insert from each	No		Tin (Sn) content of one insert from each
	each batch shall be checked and	batch shall be checked and shall be in the	comme		batch shall be checked and shall be in
	shall be in the range of 0.01 to 0.03	range of 0.01 to 0.03 percent when checked	nts		the range of 0.01 to 0.03 percent when
	percent when checked by	by spectrograph with the use of joint test			checked by spectrograph with the use of
	spectrograph with the use of joint	lug of insert as per ASTM E 351.			joint test lug of insert as per ASTM E
	test lug of insert as per ASTM E-351.				<del>351.</del>
11.4.		11.4.3 12.4.3	No		<del>11.4.3</del> 12.4.3
3		11.7.3 12.4.3	comme	-	11.1.3 12.4.3
	In addition, tensile strength test	In addition, tensile strength test shall also	nts		In addition, tensile strength test shall
	shall also be carried out on	be carried out on proportionate test pieces	1100		also be carried out on proportionate test
	proportionate test pieces machined	machined out from 1% of the castings			pieces machined out from 1% of the
	out from 1% of the castings selected	selected from every batch. The test pieces			castings selected from every batch. The
	from every batch. The test pieces	shall be machined out from suitable			test pieces shall be machined out from
	shall be machined out from suitable	locations on the castings and tested in			suitable locations on the castings and
	locations on the castings and tested	accordance with IS:1608: 2005 'Method of			tested in accordance with IS:1608: 2005
	in accordance with IS:1608: 2005	Tensile Testing of Steel Products Other than			'Method of Tensile Testing of Steel
	'Method of Tensile Testing of Steel	Sheet, Strip, Wire and Tube'. The tensile			Products Other than Sheet, Strip, Wire
	Products Other than Sheet, Strip, Wire and Tube'. The tensile strength	strength and elongation shall not be less			and Tube'. The tensile strength and
	and elongation shall not be less than	than 80% of the minimum values specified in clause 11.4.2 12.4.2 above.			elongation shall not be less than 80% of the minimum values specified in clause
	80% of the minimum values	in clause 11.1.2 12.1.2 above.			11.4.2 12.4.2 above.
	or of the minimum values				11.1.2 12.1.2 45070.
		1		1	

_	1				T	
	specified in clause 11.4.2 above.					
11.4.	The frequency of testing mentioned in clause 11.4.3 above may be at the discretion of the Inspecting authority be relaxed to one number per heat after ensuring consistency of quality of production in 20000 inserts. In case of results of 2 batches out of 5 batches going beyond permitted values, the frequency of testing shall be reverted back for 20000 inserts.	The frequency of testing mentioned in clause 11.4.3 12.4.3 above may be at the discretion of the Inspecting authority be relaxed to one number per heat after ensuring consistency of quality of production in 20000 inserts. In case of results of 2 batches out of 5 batches going beyond permitted values, the frequency of testing shall be reverted back for 20000 inserts.		No comme nts	-	11.4.4 12.4.4  The frequency of testing mentioned in clause 11.4.3 12.4.3 above may be at the discretion of the Inspecting authority be relaxed to one number per heat after ensuring consistency of quality of production in 20000 inserts. In case of results of 2 batches out of 5 batches going beyond permitted values, the frequency of testing shall be reverted back for 20000 inserts.
11.5.	Brinell Hardness test shall be carried out on the end face of the head of all the inserts selected for tensile test in accordance with IS: 1500-2005 and hardness shall not be less than 210 BHN.	Brinell Hardness test shall be carried out on the end face of the head of all the inserts selected for tensile test in accordance with IS: 1500-2005 and hardness shall not be less than 210 190 BHN.	Prime Ispat Limited	We would like to bring your kind attenti on that hardne ss and Elonga tion have an inverse relatio nship, meani ng that as hardne ss increa ses, elonga tion decrea ses. For SGCI	Suggestion cannot be accepted as Hardness range in IS-1500 is given for information only. The required test results should conform in accordance with the agreement between manufacturer and purchaser.  Hardness has been reduced from minimum 210 BHN to minimum 190 BHN.	Brinell Hardness test shall be carried out on the end face of the head of all the inserts selected for tensile test in accordance with IS: 1500-2005 and hardness shall not be less than 210 190 BHN.

11.6.		11.6.1 12.6.1	insert flexibility and elonga tion proper ties are more critical than hardne ss ensuri ng it can withst and repetiti ve stress and strain. We are hereby reques t you that minim um limit of hardne ss should be 170 BHN.	11.6.1 12.6.1
1	The castings selected as per clause 11.4.3 or 11.4.4 shall also be subjected to micro examination and the structure shall be as stipulated in clause 9 of IS: 1865-1991.	The castings selected as per clause 11.4.3 12.4.3 or 11.4.4 12.4.4 shall also be subjected to micro examination and the	comme	The castings selected as per clause 11.4.3 12.4.3 or 11.4.4 12.4.4 shall also be subjected to micro examination and the structure shall be as stipulated in clause 9 of IS: 1865-1991.

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ANN EXU RE- VI	Chemical Analysis Report of finished Castings  Da He	Chemical Analysis Report of finished  Da He	No comme nts	1	Chemical Analysis Report of finished Castings    Da   Hea   C   H E   M I S   T R Y   Remarks
ANNE XURE- IX	No. Date:  (Address of Inspection Agency)  Dear Sirs,  SUB: Railway Board/Railway Contract No dated	No. Date:  (Address of Inspection Agency)  Dear Sirs,  SUB: Railway Board/Railway Contract Nodated	No comme nts	-	No. Date:  (Address of Inspection Agency)  Dear Sirs,  SUB: Railway Board/Railway ContractNodated for manufacture & supply ofSGCI inserts to Drg. No. RDSO/TAlt.

SGCI inserts as per the following	SGCI inserts as per the following details	SGCI inserts as per the following
details are offered for inspection.	are offered for inspection. The inserts	details are offered for inspection. The
The inserts have been internally	have been internally checked as per	inserts have been internally checked
checked as per	Drawing No. Altand IRS/T-46-	as per Drawing No. Altand IRS/T-46- 2023 2025 and found
	2023 2024 and found satisfactory.	satisfactory.
Drawing No. Altand		
IRS/T-46- 2023 and found	1. Installment No.	1. Installment No.
satisfactory.	2. Qty. on Order	2. Qty. on Order
	3. Qty. previously inspected & passed	3. Qty. previously inspected &
1. Installment No.	4. Qty. offered for inspection	passed
2. Qty. on Order	5. Rate	4. Qty. offered for inspection
3. Qty. previously inspected &	6. Delivery period	5. Rate
passed	1 1	
4. Qty. offered for inspection	7. Marking on inserts	6. Delivery period
5. Rate	8. Packing	7. Marking on inserts
6. Delivery period	9. Consignee	8. Packing
7. Marking on inserts	Heatwise details of the inserts offered for	9. Consignee
8. Packing	inspection are as per Annexure.	Heatwise details of the inserts offered for
9. Consignee	Inspection of the inserts may please be	inspection are as per Annexure.
	carried out.	Inspection of the inserts may please be
Heatwise details of the inserts	Thanking you,	carried out.
offered for inspection are as per		Thanking you,
Annexure.	Encl: One annexure	
Inspection of the inserts may please		Encl: One annexure
be carried out.		
Thanking you,		
mammig you,	Yours faithfully,	
Encl: One annexure		Yours faithfully,
Elici. Olic allifexure	(Signature with Date)	
Yours faithfully,	Name	(Signature with Date)
Tours faithfully,	Designation	Name
(Ciana atauna arith, Data)		Designation
(Signature with Date)		
Name		
Designation		