Reasoned Document for Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)
0	Forward	0.1 This specification was originally issued in 1980. In its first revision in 1987, the tensile and cross-breaking strength values were revised.	No comments/Suggestions from approved/ developmental vendors has been received	No change	This specification was originally issued in 1980. In its first revision in 1987, the tensile and cross-breaking strength values were revised.
		0.1 In the second revision of the provisional specification issued in 1993, the acceptance tests earlier required to be conducted on "as moulded specimens" were specified to be conducted on liners after the conditioning, except that the cross-breaking load test of GFN Liner shall be done on "as moulded" liners.	No comments/Suggestions from approved/ developmental vendors has been received	No change	In the second revision of the provisional specification issued in 1993, the acceptance tests earlier required to be conducted on "as moulded specimens" were specified to be conducted on liners after the conditioning, except that the cross-breaking load test of GFN Liner shall be done on "as moulded" liners.
		0.2 For deciding whether a particular requirement of this standard is complied with, the final value observed or calculated expressing the results of a test or analysis, shall be rounded off in accordance with IS 2. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.	No comments/Suggestions from approved/ developmental vendors has been received	No change	For deciding whether a particular requirement of this standard is complied with, the final value observed or calculated expressing the results of a test or analysis, shall be rounded off in accordance with IS 2. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.
		0.3 The IRS Specification (provisional)-1993 second revision was discussed in the 66th Track Standards committee meeting and as approved by the Railway Board, the specification has been issued under the fixed serial No.T-44-1995 with minor modification in clause 4.2.2 in the present form.	No comments/Suggestions from approved/ developmental vendors has been received	No change	The IRS Specification (provisional)-1993 second revision was discussed in the 66th Track Standards committee meeting and as approved by the Railway Board, the specification has been issued under the fixed serial No.T-44-1995 with minor modification in clause 4.2.2 in the present form.
		0.4 To improve the quality and serviceability, corrigendum no. 01 to 06 were issued in 2007, 2009, 2010, 2013, 2016 & 2018 respectively	No comments/Suggestions from approved/ developmental vendors has been received	No change	To improve the quality and serviceability, corrigendum no. 01 to 06 were issued in 2007, 2009, 2010, 2013, 2016 & 2018 respectively
		0.5 This specification has now been revised and issued in	No	No change	This specification has now been revised and issued in 2020 to

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		2020 to cover the entire Corrigendums issued to this specification till date and updating the latest revision of relevant codes.	comments/Suggestions from approved/ developmental vendors has been received		cover the entire Corrigendums issued to this specification till date and updating the latest revision of relevant codes.
		0.6 This specification has now been revised and issued in 2023 to cover the provisions for HVN-66 liner.	No comments/Suggestions from approved/ developmental vendors has been received	No change	This specification has now been revised and issued in 2023 to cover the provisions for HVN-66 liner.
1.0	Scope	This specification covers the requirements, method of tests and sampling for Glass filled Nylon-66 and High Viscous Nylon-66 insulating liners interposed between the rail and the Elastic Rail Clips in rail fastening assembly mainly to provide electrical insulation. All the provisions contained RDSO's ISO procedures laid down in Document No. QO-D-7.1-11 dated 19.07.2016 (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.	Comments of M/s Industrial Components Industries & M/s Polymer Products of India	Comments of the firms are accepted. Para is modified. Detailed Remarks at Annexure-I	This specification covers the requirements, method of tests and sampling for Glass filled Nylon-66 and High Viscous Nylon-66 insulating liners interposed between the rail and the Elastic Rail Clips in rail fastening assembly mainly to provide electrical insulation. All the provisions contained RDSO's ISO procedures laid down in Document ~~No. QO-D-7.1-11 dated 19.07.2016~~ No. QO-D-8.1-11 dated 30.11.2022 (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.
2.0	**TERMINOLOGY**	2.1 **GFN-66:** It is glass filled nylon-66	No comments/Suggestions from approved/ developmental vendors has been received	No change	**2.1 GFN-66:** It is glass filled nylon-66
		2.2 HVN-66: High Viscous Nylon-66	No comments/Suggestions from approved/ developmental vendors has been received	No change	**2.2 HVN-66:** High Viscous Nylon-66
		2.3 As moulded specimen: It is defined as that specimen which upon immediate removal from the mould is	No comments/Suggestions	No change	**2.3 As moulded specimen:** It is defined as that specimen which upon immediate removal from the mould is sealed in container

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
<tr><td></td><td></td><td>sealed in container impermeable to moisture/water vapour.</td><td>from approved/ developmental vendors has been received</td><td></td><td>impermeable to moisture/water vapour.</td></tr>
<tr><td></td><td></td><td>2.4 Dry weight: It refers to the weight of the as moulded specimen</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>2.4 Dry weight: It refers to the weight of the as moulded specimen</td></tr>
<tr><td></td><td></td><td>2.5 Conditioning: It is the process which consists in keeping the liners immersed in boiling water for a period sufficient for the liner to absorb specified percentage of water</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>2.5 Conditioning: It is the process which consists in keeping the liners immersed in boiling water for a period sufficient for the liner to absorb specified percentage of water</td></tr>
<tr><td></td><td></td><td>2.6 Type tests: These refer to the tests given in Table-1 of this specification to be conducted on moulded test specimen to assess the moulding capability/process control of a firm for quality assurance.</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>2.6 Type tests: These refer to the tests given in Table-1 of this specification to be conducted on moulded test specimen to assess the moulding capability/process control of a firm for quality assurance.</td></tr>
<tr><td></td><td></td><td>2.7 Pre-acceptance tests: These refer to the tests which are required to be conducted on the test specimen before according clearance to the firm for bulk production of liners.</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>2.7 Pre-acceptance tests: These refer to the tests which are required to be conducted on the test specimen before according clearance to the firm for bulk production of liners.</td></tr>
<tr><td></td><td></td><td>2.8 Acceptance tests: These refer to the tests conducted on the liners for purpose of acceptance/rejection of the liners during inspection.</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>2.8 Acceptance tests: These refer to the tests conducted on the liners for purpose of acceptance/rejection of the liners during inspection.</td></tr>
<tr><td>3.0</td><td>REFERENCE DOCUMENTS</td><td>3.1 This standard refers to the following/BS/IS/ASTM specifications. These should be available at the manufacturer's work premises for reference.
<table><tr><td>S. N</td><td>Standard</td><td>Title</td></tr><tr><td>1.</td><td>IS:5762-1970, (Reaffirmed</td><td>Method for Determination of Melting Point and Melting Range.</td></tr></table></td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>3.1 This standard refers to the following/BS/IS/ASTM specifications. These should be available at the manufacturer's work premises for reference.
<table><tr><td>S. N</td><td>Standard</td><td>Title</td></tr><tr><td>1.</td><td>IS:5762-1970, (Reaffirmed</td><td>Method for Determination of Melting Point and Melting Range.</td></tr></table></td></tr>
</table>

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			2020)					2020)	
		2	BS EN ISO 1183-1:2019	Plastics- Method for determining the density of non cellular plastic			2	BS EN ISO 1183-1:2019	Plastics- Method for determining the density of non cellular plastic
		3	BS ISO 14309:2019	Rubber, Vulcanized or thermoplastic- Determination of volume and/or surface resistivity			3	BS ISO 14309:2019	Rubber, Vulcanized or thermoplastic- Determination of volume and/or surface resistivity
		4	IS:1998-1962 (Reaffirmed 2018)	Method of test for thermosetting synthetic resin bonded laminated sheets.			4	IS:1998-1962 (Reaffirmed 2018)	Method of test for thermosetting synthetic resin bonded laminated sheets.
		5	(ASTM D785 – 08(2015)	Standard test method for Rockwell hardness of plastics and electrical insulating materials.			5	(ASTM D785 – 08(2015)	Standard test method for Rockwell hardness of plastics and electrical insulating materials.
		6	ASTM-D-638-14	Standard test method for tensile properties of plastics.			6	ASTM-D-638-14	Standard test method for tensile properties of plastics.
		7	ASTM-D-149-20	Standard test method for dielectric breakdown voltage and dielectric strength of solid electrical insulating materials at commercial power frequency.			7	ASTM-D-149-20	Standard test method for dielectric breakdown voltage and dielectric strength of solid electrical insulating materials at commercial power frequency.
		8	IS: 2-1960 (Reaffirmed 2016)	Rules for rounding off numerical values.			8	IS: 2-1960 (Reaffirmed 2016)	Rules for rounding off numerical values.
		9	IS:7151-91	Corrugated fiberboard boxes for para-dropping of supplies – specification			9	IS:7151-91	Corrugated fiberboard boxes for para-dropping of supplies – specification
		10	ISO:178:2010 or ASTM:D790	Determination of flexural properties			10	ISO:178:2010 or ASTM:D790	Determination of flexural properties
		11	BS ISO 14309:2019	Determination of volume and/or surface resistivity			11	BS ISO 14309:2019	Determination of volume and/or surface resistivity
		12	ISO: 307	Determination of viscosity number			12	ISO: 307	Determination of viscosity number
		13	IS :3073-1967	Assessment of surface roughness			13	IS :3073-1967 (Reaffirmed	Assessment of surface roughness

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		3 (Reaffirmed 2009)			2009)
					14 ISO 111357-3:2018 Determination of temperature and enthalpy of melting and crystallization
		3.2 The specific provision in this standard will over-ride these in the above specification where these are not in conformity with one another. Any specific requirement given in the drawing of the liner will over-ride the relevant provision of this standard specification.	No comments/Suggestions from approved/ developmental vendors has been received	No change	3.2 The specific provision in this standard will over-ride these in the above specification where these are not in conformity with one another. Any specific requirement given in the drawing of the liner will over-ride the relevant provision of this standard specification.
		3.3 RDSO drawings relevant to the liner under production should be available for reference at the manufacturer's works.	No comments/Suggestions from approved/ developmental vendors has been received	No change	3.3 RDSO drawings relevant to the liner under production should be available for reference at the manufacturer's works.
4.0	**MANUFACTURE**	4.1 **Material**			
		4.1.1 Material for GFN Liner: The material used for manufacture of insulating liners shall be glass filled nylon 66 (GFN-66) Moulding Nylon Granules of natural colours with about 33% glass filler equipped with UV resistant properties which should be clearly indicated in the raw material certificate. Addition of any colourants during moulding of liners is not permitted and the reconstituted or recovered material shall not be used for the manufacture of liners.	No comments/Suggestions from approved/ developmental vendors has been received	No change	**4.1.1 Material for GFN Liner**: The material used for manufacture of insulating liners shall be glass filled nylon 66 (GFN-66) Moulding Nylon Granules of natural colours with about 33% glass filler equipped with UV resistant properties which should be clearly indicated in the raw material certificate. Addition of any colourants during moulding of liners is not permitted and the reconstituted or recovered material shall not be used for the manufacture of liners.
		4.1.2 **Material for HVN Liner**: The material used for the manufacture of Insulating Liners shall be "High Viscosity Nylon 66" as specified in RAL color standard mentioned in this clause or the relevant drawing Regenerated / reconstituted material shall not be used for the manufacture of liners. The manufacturer shall have a valid tie-up in the form of a written Memorandum of Understanding (MOU)/contract with primary raw material manufacturer for "Nylon 66 (HVN-66)" or other equivalent "Nylon 66 (HVN-66)",	Comments of i. M/s Okay Industries, ii. M/s Carbonaire Industries (Madras) Pvt.Ltd., iii. M/s UNIQUE PLASTIC INDUSTRIES, iv. M/s CALSTAR STEEL LIMITED, v. M/s Black Burn & Co. Pvt. Ltd.,	Para has been modified Detailed Remarks at Annexure-1	**4.1.2 Material for HVN Liner**: **Material for HVN Liner** :The material used for the manufacture of Insulating Liners shall be "High Viscosity Nylon 66" as specified in RAL colour standard mentioned in this clause or otherwise mentioned in the relevant drawing. Regenerated / reconstituted material shall not be used for the manufacture of liners. The manufacturer of HVN liner shall have a valid tie-up in the form of a written Memorandum of Understanding (MOU)/Contract with Primary raw material manufacturer for

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<tr>
<td></td>
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<td>covering raw material supplies and technical support including quality control. The manufacturer of the insulating liners shall not change the constituents of the copolymer and shall only mould the liners out of the material supplied to them by the primary manufacturer.

During inspection of HVN Liner, the supplier should submit, the invoice alongwith e-way bill in support of procurement of raw material of particular grade from the primary raw material manufacturer with whom the written Memorandum of Understanding (MOU)/Contract has been signed.

Respective RAL color should be UV stabilized. Liner supplier has to submit the certificate of conformity for UV resistant property of the product material as well as the RAL colour as obtained from the primary raw material and RAL colour manufacturer.
<table>
<tr><th>S No.</th><th>Color</th><th>RAL</th><th>Liner Drg. No.</th></tr>
<tr><td>1</td><td>Brown Beige</td><td>1011</td><td>RT-3702</td></tr>
<tr><td>2</td><td>Traffic Red</td><td>3020</td><td>RT-3706</td></tr>
<tr><td>3</td><td>Heather Violet</td><td>4003</td><td>RT-3707</td></tr>
<tr><td>4</td><td>Grey Beige</td><td>1019</td><td>RT-3708</td></tr>
<tr><td>5</td><td>Emerald Green</td><td>6001</td><td>RT-6937</td></tr>
<tr><td>6</td><td>Signal Blue</td><td>5005</td><td>RT-6938</td></tr>
<tr><td>7</td><td>Saffron Yellow</td><td>1017</td><td>RT-6939</td></tr>
<tr><td>8</td><td>Coral Red</td><td>3016</td><td>RT-8751</td></tr>
<tr><td>9</td><td>Traffic Yellow</td><td>1023</td><td>RT-8752</td></tr>
<tr><td>10</td><td>Traffic Green</td><td>6024</td><td>RT-8753</td></tr>
</table>
</td>
<td>vi. M/s Polyset Plastics Art. Ltd. &
vii. M/s Avadh Rail Infra Ltd</td>
<td></td>
<td>"Nylon 66 (HVN-66)" ~~or other equivalent "Nylon 66 (HVN 66)"~~, covering raw material supplies and technical support including quality control. The manufacturer of the HVN insulating liners shall ~~not change the constituents of the copolymer and~~ shall only mould the liners out of the material supplied to them by the primary manufacturer.
Note:
i) Primary raw material manufacturer can have a valid tie-up with one or more manufacturers of HVN liners or vice versa.
ii)A Primary raw material manufacturer should mandatorily have facility the of polymerization plant to manufacture HVN 66 material starting from the precursor materials like Hexa Methylene Diamine (HMD) and / or Adipo Nitrile (ADN)

The credentials of primary raw material manufacturer should be clearly mentioned in following in the MoU/Contract and should include.

i) Declaration that they are the primary raw material manufacture as defined above
ii) Grade of raw material being supplied along with its data sheet.

During inspection of HVN Liner, the supplier should submit, the invoice alongwith e-way bill in support of procurement of raw material of particular grade from the primary raw material manufacturer with whom the written Memorandum of Understanding (MOU)/Contract has been signed .

Respective RAL color should be colour-fast coloured masterbatchs ~~UV stabilized. Liner supplier has to submit the certificate of conformity for UV resistant property of the product material as well as the RAL colour as obtained from the primary raw material and RAL colour manufacturer.~~</td>
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<tr><td></td><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>S No.</th><th>Color</th><th>RAL</th><th>HVN Liner Drg. No.</th></tr>
<tr><td>1</td><td><s>Brown Beige</s>
Brown Red</td><td><s>1011</s>
3011</td><td>RT-3702</td></tr>
<tr><td>2</td><td><s>Traffic Red</s>
Brown Red</td><td><s>3020</s>
3011</td><td>RT-3706</td></tr>
<tr><td>3</td><td><s>Heather Violet</s>
Mint Green</td><td><s>4003</s>
6029</td><td>RT-3707</td></tr>
<tr><td>4</td><td><s>Grey Beige</s>
Cobalt Blue</td><td><s>1019</s>
5013</td><td>RT-3708</td></tr>
<tr><td>5</td><td><s>Emerald Green</s>
Brown Red</td><td><s>6001</s>
3011</td><td>RT-6937</td></tr>
<tr><td>6</td><td><s>Signal Blue</s>
Mint Green</td><td><s>5005</s>
6029</td><td>RT-6938</td></tr>
<tr><td>7</td><td><s>Saffron Yellow</s>
Cobalt Blue</td><td><s>1017</s>
5013</td><td>RT-6939</td></tr>
<tr><td>8</td><td><s>Coral Red</s>
Brown Red</td><td><s>3016</s>
3011</td><td>RT-8751</td></tr>
<tr><td>9</td><td><s>Traffic Yellow</s>
Mint Green</td><td><s>1023</s>
6029</td><td>RT-8752</td></tr>
<tr><td>10</td><td><s>Traffic Green</s>
Cobalt Blue</td><td><s>6024</s>
5013</td><td>RT-8753</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td>4.1.3 The physical properties of GFN-66 material used for the manufacture of nylon mouldings shall conform to the requirements given against. No. 1,2,3 of Table 1. Other properties as given in Table 1 refer to the as moulded test specimen of GFN-66 material.

4.1.4 The physical properties of HVN-66 material used for the manufacture of nylon mouldings shall conform to the requirements given against. No. 1,2,3 & 10 of Table 1. Other properties as given in Table 1 refer to the as moulded test specimen of HVN-66 material.

Table-1</td><td>Comments of
i) M/s Okay Industries,
ii) M/s Industrial Components Industries,
iii) M/s Polymer Products Of India,
iv) M/s Carbonaire Industries (Madras) Pvt. Ltd.,
v) M/s Unique Plastic Industries,
vi) M/s Calstar Steel Limited,
vii) M/s Black Burn & Co. Pvt. Ltd.,
viii) M/s Moulded Fiberglass,
ix) M/s Polyset Plastics</td><td>Para has been modified. Detailed Remarks at Annexure-I</td><td>4.1.3 The physical properties of GFN-66 material used for the manufacture of nylon mouldings shall conform to the requirements given against. No. 1,2,3 of Table 1A. Other properties as given in Table-1A refer to the as moulded test specimen of GFN-66 material.

4.1.4 The physical properties of HVN-66 material used for the manufacture of nylon mouldings shall conform to the requirements given against. No. 1,2,3 & 10 of Table 1B. Other properties as given in Table-1B refer to the as moulded test specimen of HVN-66 material.

TABLE-1A (For GFN Liners)</td></tr>
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<tr>
<td></td>
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<td>
<table>
<tr><th rowspan="2">S.No</th><th rowspan="2">Property</th><th rowspan="2">Units</th><th colspan="2">Acceptance Values</th><th rowspan="2">Test method</th></tr>
<tr><th>GFN Liner</th><th>HVN Liner</th></tr>
<tr><td>1.</td><td>Melting point</td><td>°C</td><td>258-268</td><td>255-265</td><td>IS:5762-1970</td></tr>
<tr><td>2.</td><td>Specific gravity</td><td>-</td><td>1.38-1.43</td><td>1.10-1.16</td><td>BS EN ISO 1183-1:2019</td></tr>
<tr><td rowspan="2">3.</td><td>Glass filler/</td><td rowspan="2">%</td><td>33±2</td><td>--</td><td>Appendix IIIA</td></tr>
<tr><td>Ash content</td><td>--</td><td>0.5 (max)</td><td>Appendix IIIB</td></tr>
<tr><td>4.</td><td>Hardness Rockwell</td><td>R</td><td>110(min)</td><td>100 (min)</td><td>ASTM D-785-08(2015)</td></tr>
<tr><td>5.</td><td>Tensile strength</td><td>Kg/mm^2</td><td>17.5(min)</td><td>7.0(min)</td><td>ASTM D-638-14</td></tr>
<tr><td>6.</td><td>Elongation at break</td><td>%</td><td>10 (max)</td><td>35 (min)</td><td>-do-</td></tr>
<tr><td>7.</td><td>Cross-breaking strength</td><td>Kg/mm^2</td><td>20.0(min)</td><td>--</td><td>IS:1998-1962 (Reaffirmed 2018)</td></tr>
<tr><td>8.</td><td>Dielectric strength</td><td>KV/mm</td><td>11(min)</td><td>11(min)</td><td>ASTM D-149-20</td></tr>
<tr><td>9.</td><td>Volume resistivity</td><td>Ohm. Cm</td><td>10^8(min)</td><td>10^{14}(min)</td><td>BS ISO 14309:2019</td></tr>
<tr><td>10.</td><td>Viscosity Number of raw</td><td>cm^3/g</td><td>--</td><td>270 (min)</td><td>ISO 307</td></tr>
</table>
</td>
<td>x) Art. Ltd. & M/s Avadh Rail Infra Ltd</td>
<td></td>
<td>
<table>
<tr><th rowspan="2">S.No</th><th rowspan="2">Property</th><th rowspan="2">Units</th><th colspan="2">Acceptance Values</th><th rowspan="2">Test method</th></tr>
<tr><th>GFN Liner</th><th>~~HVN Liner~~</th></tr>
<tr><td>1.</td><td>Melting point</td><td>°C</td><td>258-268</td><td>~~255-265~~</td><td>IS:5762-1970</td></tr>
<tr><td>2.</td><td>Specific gravity</td><td>-</td><td>1.38-1.43</td><td>~~1.10-1.16~~</td><td>BS EN ISO 1183-1:2019</td></tr>
<tr><td rowspan="2">3.</td><td>Glass filler/</td><td rowspan="2">%</td><td>33±2</td><td>~~--~~</td><td>Appendix IIIA</td></tr>
<tr><td>~~Ash content~~</td><td>--</td><td>~~0.5 (max)~~</td><td>Appendix IIIB</td></tr>
<tr><td>4.</td><td>Hardness Rockwell</td><td>R</td><td>110(min)</td><td>~~100 (min)~~</td><td>ASTM D-785-08(2015)</td></tr>
<tr><td>5.</td><td>Tensile strength</td><td>Kg/mm^2</td><td>17.5(min)</td><td>~~7.0(min)~~</td><td>ASTM D-638-14</td></tr>
<tr><td>6.</td><td>Elongation at break</td><td>%</td><td>10 (max)</td><td>~~35 (min)~~</td><td>-do-</td></tr>
<tr><td>7.</td><td>Cross-breaking strength</td><td>Kg/mm^2</td><td>20.0(min)</td><td>~~--~~</td><td>IS:1998-1962 (Reaffirmed 2018)</td></tr>
<tr><td>8.</td><td>Dielectric strength</td><td>KV/mm</td><td>11(min)</td><td>~~11(min)~~</td><td>ASTM D-149-20</td></tr>
<tr><td>9.</td><td>Volume resistivity</td><td>Ohm. Cm</td><td>10^8(min)</td><td>~~10^{14}(min)~~</td><td>BS ISO 14309:2019</td></tr>
<tr><td>~~10~~</td><td>~~Viscosity Number of raw material~~</td><td>~~cm^3/g~~</td><td>~~-~~</td><td>~~270 (min)~~</td><td>~~ISO 307~~</td></tr>
<tr><td>~~11~~</td><td>~~Flexural Modulus~~</td><td>~~Kg/mm^2~~</td><td></td><td>~~250.0 (min)~~</td><td>~~ISO:178:2010 or ASTM: D 790~~</td></tr>
<tr><td>~~12~~</td><td>~~Surface roughness~~</td><td>~~Ra~~</td><td></td><td>~~0.1-0.2~~</td><td>~~IS :3073-1967 (Reaffirmed 2009)~~</td></tr>
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<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
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<tr><td></td><td>material</td><td></td><td></td><td></td><td></td></tr>
<tr><td>11.</td><td>Flexural Modulus</td><td>Kg/mm^2</td><td>--</td><td>250.0 (min)</td><td>ISO:178:2010 or ASTM: D 790</td></tr>
<tr><td>12</td><td>Surface roughness</td><td>Ra</td><td>--</td><td>0.1-0.2</td><td>IS :3073-1967 (Reaffirmed 2009)</td></tr>
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<td></td>
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<td>
TABLE-1B (For HVN Liners)
<table>
<tr><th>S. No</th><th>Property</th><th>Units</th><th>Acceptance Values
HVN Liner</th><th>Test method</th></tr>
<tr><td>1.</td><td>Melting point</td><td>°C</td><td>~~255-265~~ 260 (min)</td><td>~~IS:5762-1970~~ ISO 11357-3-2018</td></tr>
<tr><td>2.</td><td>Specific gravity</td><td>-</td><td>1.10-1.16</td><td>BS EN ISO 1183-1:2019</td></tr>
<tr><td>3.</td><td>Ash content</td><td>%</td><td>0.5 (max)</td><td>Appendix IIIB</td></tr>
<tr><td>4.</td><td>Hardness Rockwell</td><td>R</td><td>100 (min)</td><td>ASTM D-785-08(2015)</td></tr>
<tr><td>5.</td><td>Tensile strength</td><td>Kg/mm^2</td><td>7.0(min)</td><td>ASTM D-638-14</td></tr>
<tr><td>6.</td><td>Elongation at break</td><td>%</td><td>35 (min)</td><td>-do-</td></tr>
<tr><td>~~7.~~</td><td>~~Cross-breaking strength~~</td><td>~~Kg/mm^2~~</td><td>~~--~~</td><td>~~IS:1998-1962 (Reaffirmed 2018)~~</td></tr>
<tr><td>8.</td><td>Dielectric strength</td><td>KV/mm</td><td>11(min)</td><td>ASTM D-149-20</td></tr>
<tr><td>9.</td><td>Volume resistivity</td><td>Ohm. Cm</td><td>10^{14}(min)</td><td>BS ISO 14309:2019</td></tr>
<tr><td>10.</td><td>Viscosity Number of raw material</td><td>cm^3/g</td><td>270 (min)</td><td>ISO 307</td></tr>
<tr><td>11.</td><td>Flexural Modulus</td><td>Kg/mm^2</td><td>250.0 (min)</td><td>ISO:178:2010 or ASTM: D 790 As per details in Appendix X</td></tr>
<tr><td>12</td><td>~~Surface roughness~~</td><td>~~Ra~~</td><td>~~0.1-0.2~~</td><td>~~IS :3073-1967 (Reaffirmed 2009)~~</td></tr>
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SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)
		4.1.5 The conformity of physical properties of raw material to clause ~~4.1.2~~, 4.1.3 or 4.1.4, as applicable ~~either procured from sources who have been in the business of manufacturing & supplying 'Glass Filled Nylon 66 (GFN 66) Moulding Granules' or from other sources~~ shall be checked through outside independent agencies i.e. Government laboratory or from lab accredited by Accreditation agency as per extant guidelines issued by RDSO or National Test House or Regional Test Centre (RTC). For this purpose, raw material & samples (specifically prepared & sealed in the presence of RDSO officials) shall be sent to such labs / agencies for testing at firm's cost at a frequency of once in three years and /or in the event of change of raw material procurement source. The test report of such samples shall be directly sent to RDSO by such labs/agencies. After receipt of satisfactory report, raw material shall be permitted for use. Responsibility of using the passed raw material for manufacture of liners shall lie ~~on~~ with the firm. The records of raw material procurement, whatever the case may be, shall be maintained along with its consumption details and furnished to RDSO/ Railway Officials/Inspecting Authority as and when required by them. The responsibility of ensuring authenticity of all such records shall lie ~~on~~ with the firm.	Comments of i) M/s Industrial Components Industries, ii) M/s Polymer Products Of India & iii) M/s Black Burn & Co. Pvt. Ltd.	Para has been modified. Detailed Remarks at Annexure-I	The conformity of physical properties of raw material to clause, 4.1.3 or 4.1.4, as applicable shall be checked through outside independent agencies i.e. Government laboratory or from lab accredited by Accreditation agency as per extant guidelines issued by RDSO or National Test House or Regional Test Centre (RTC). For this purpose, raw material & samples (specifically prepared & sealed in the presence of RDSO officials) shall be sent to such labs / agencies for testing at firm's cost at a frequency of once in three years and /or in the event of change of raw material procurement source. The test report of such samples shall be directly sent to RDSO by such labs/agencies. After receipt of satisfactory report, raw material shall be permitted for use. Responsibility of using the passed raw material for manufacture of liners shall lie with the firm. The records of raw material procurement, whatever the case may be, shall be maintained along with its consumption details and furnished to RDSO/ Railway Officials/Inspecting Authority as and when required by them. The responsibility of ensuring authenticity of all such records shall lie with the firm.
	4.2 **MANUFACTURI**	4.2.1 The glass filled nylon-66 and High viscous nylon-66 liners shall be manufactured by automatic screw type injection moulding machine.	Comments of i) M/s Black Burn & Co. Pvt. Ltd., ii) M/s Adinath Industries	Para has been modified. Detailed	The glass filled nylon-66 and High viscous nylon-66 liners shall be manufactured by automatic screw type injection moulding machine. Raw Material must be preheated in Dehumidifier Chamber (with dew

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	NG PROCESS	Raw Material must be preheated in Dehumidifier Chamber (with dew point - 30). Before molding moisture content should not be more than 0.2%.	& iii)M/s Parasnath Enterprises:	Remarks at Annexure-I	point from – 20° C to – 30° C). Before molding moisture content should not be more than 0.2%.
		4.2.2 The liner shall be conditioned by immersing in boiling water for adequate time to ensure minimum 3% absorption for GFN Liner & minimum 1.6% absorption for HVN Liner of water as provided in para 7.7 (iii)	Comments of i) M/s Polyset Plastics Pvt. Ltd.	Remarks at Annexure-1	The GFN liner shall be conditioned by immersing in boiling water for adequate time to ensure minimum 3% absorption of water for GFN Liner ~~& minimum 1.6% absorption for HVN Liner of water~~ as provided in para 7.7 (iii)
		4.2.3 **Marking:** Each nylon moulding shall be legibly embossed in 3mm letters and figures with manufacturer's initials, last two digits of year of manufacture and part number as shown in RDSO drawing.	No comments/Suggestions from approved/ developmental vendors has been received	No change	**Marking:** Each nylon moulding shall be legibly embossed in 3mm letters and figures with manufacturer's initials, last two digits of year of manufacture and part number as shown in RDSO drawing.
		4.2.4 **Freedom from Defects:** The surface of the nylon liners shall be smooth, sound and free from moulding defects such as bubbles, splash marks, burn marks, voids, surface sinking, crazing and blistering of the surface, windows, weld lines, laminations, jotting and cracks. All edges shall be neatly finished and free from flash.	No comments/Suggestions from approved/ developmental vendors has been received	No change	**Freedom From Defects:** The surface of the nylon liners shall be smooth, sound and free from moulding defects such as bubbles, splash marks, burn marks, voids, surface sinking, crazing and blistering of the surface, windows, weld lines, laminations, jotting and cracks. All edges shall be neatly finished and free from flash.
5.0	**PRE ACCEPTANCE TESTS:**	5.1 **Type tests**: These tests shall be conducted on 'as moulded test specimen' as per scheme of testing given in Appendix I. The results of testing shall conform to the values given in Table 1.	Comments of i) M/s Black Burn & Co. Pvt. Ltd. :	Para has been modified. Detailed Remarks at Annexure-I	**Type tests**: These tests shall be conducted on 'as moulded test specimen' as per scheme of testing given in Appendix I . The results of testing shall conform to the values given in Table 1A & 1B
		5.2 **Product testing:**			**5.2 Product testing:**
		5.2.1 All tests shall be conducted on conditioned liners for the properties and scheme of testing as given in Appendix 1(B). The results of the tests shall conform to the requirements of clause 7.	No comments/Suggestions from approved/ developmental vendors has been received	Para has been revised	For GFN liners all tests shall be conducted on conditioned liners, for HVN liners all tests shall be conducted on as moulded liners, for the properties and scheme of testing as given in Appendix 1(B). The results of the tests shall conform to the requirements of clause 7.
		5.2.1 The cross breaking load test shall be conducted as	No comments/Suggestions	No change	The cross breaking load test for GFN liner shall be conducted as per method of test given in Appendix II. Each test value shall conform to the

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		per method of test given in Appendix II. Each test value shall conform to the requirement of test value given in Appendix II.	from approved/ developmental vendors has been received		requirement of test value given in Appendix II.
		5.2.2 The dimensions shall be checked by means of inspection gauges, as per RDSO drawings.	No comments/Suggestions from approved/ developmental vendors has been received	No change	The dimensions shall be checked by means of inspection gauges, as per RDSO drawings.
6.0	**ACCEPTANCE TESTS**	All tests given under Clause **7** shall be conducted on conditioned liners. For water absorption test 10 nos. of 'as-moulded' liners from each lot or part thereof produced from all cavities used for production shall be preserved by the manufacturer for determination of dry weight of the liners.	Comments of i) M/s Polymer Products Of India:	Para has been modified. Detailed Remarks at Annexure-I	All tests given under Clause **7** shall be conducted on conditioned GFN liners and as moulded HVN liners. ~~For water absorption test 10 nos. of 'as-moulded' liners from each lot or part thereof produced from all cavities used for production shall be preserved by the manufacturer for determination of dry weight of the liners.~~
		6.1 Lot size: For purpose of inspection of the liners, 10,000 nos. of liners or part thereof duly conditioned shall form a lot.	Comments of i) M/s Polymer Products Of India	Para has been modified. Detailed Remarks at Annexure-I	**Lot size:** For purpose of inspection of the liners, 10,000 nos. of liners or part thereof duly conditioned shall form a lot.
		6.2 Sample size: The sample size for tests shall be as given in each test. The samples for different tests shall be drawn at random from each lot.	No comments/Suggestions from approved/ developmental vendors has been received	No change	**Sample size:** The sample size for tests shall be as given in each test. The samples for different tests shall be drawn at random from each lot.
7.0	**TESTS**	Test as given clause 7.1 to 7.4 shall be conducted on any three of the five sample liners as drawn for internal cavity test under clause 7.5.	No comments/Suggestions from approved/ developmental vendors has been received	No change	Test as given clause 7.1 to 7.4 shall be conducted on any three of the five sample liners as drawn for internal cavity test under clause 7.5.
		7.1 **Melting point** Three sample liners per lot shall be checked for melting point of the material of the liners. For acceptance of the lot, each individual sample shall pass the requirement of the test value given in Table-1 when tested in accordance with the relevant standard given in Table-1.	No comments/Suggestions from approved/ developmental vendors has been received	Table for HVN liner added. Accordingly, Para has been revised	7.1 **Melting point** Three sample liners per lot shall be checked for melting point of the material of the liners. For acceptance of the lot, each individual sample shall pass the requirement of the test value given in Table-1A for GFN & Table-1B for HVN when tested in accordance with the relevant standard given in respective tables ~~Table 1.~~

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		7.2 **Specific gravity** Three sample liners per lot shall be checked for specific gravity of the material of the liners. Specimen for specific gravity shall be taken from middle portion of the liners. For acceptance of lot, each individual sample shall pass the requirement of the test value given in Table-1, when tested in accordance with the relevant standard given in Table-1.	No comments/Suggestions from approved/ developmental vendors has been received	Table for HVN liner added. Accordingly, Para has been revised	7.2 **Specific gravity** Three sample liners per lot shall be checked for specific gravity of the material of the liners. Specimen for specific gravity shall be taken from middle portion of the liners. For acceptance of the lot, each individual sample shall pass the requirement of the test value given in Table-1A for GFN & Table-1B for HVN when tested in accordance with the relevant standard given in respective tables ~~Table-1.~~
		7.3 **Glass filler/ Ash Content** Three sample liners per lot shall be checked for glass filler (percent) for GFN Liners or Ash content (percent) for HVN Liners of the material of the liners. For acceptance of the lot, each individual sample shall pass the requirement of test value given in Table-1 when tested and calculated in accordance with the method given in Appendix IIIA or IIIB as applicable.	No comments/Suggestions from approved/ developmental vendors has been received	Table for HVN liner added. Accordingly, Para has been revised	7.3 **Glass filler/ Ash Content** Three sample liners per lot shall be checked for glass filler (percent) for GFN Liners or Ash content (percent) for HVN Liners of the material of the liners. For acceptance of the lot, each individual sample shall pass the requirement of the test value given in Table-1A for GFN & Table-1B for HVN when tested in accordance with the method given in Appendix IIIA or IIIB as applicable.
		7.4 **Hardness Test (Method of testing as per ASTM D-785-08 (2015)** Three tests sample liners per lot shall be checked for hardness (Rockwell) of the liners at three different locations on the surface of the liners. For acceptance of the lot each individual value on the three sample liners shall not be less than 100 Rockwell for GFN liner and not be less than 90 Rockwell for HVN liner.	No comments/Suggestions from approved/ developmental vendors has been received	No change	7.4 **Hardness Test (Method of testing as per ASTM D-785-08 (2015)** Three tests sample liners per lot shall be checked for hardness (Rockwell) of the liners at three different locations on the surface of the liners. For acceptance of the lot each individual value on the three sample liners shall not be less than 100 Rockwell for GFN liner and ~~not be less than 90 Rockwell for~~ HVN liner.
		7.5 **Internal cavity test:** Five sample liners per lot shall be checked for internal cavities. On sectioning along "y-y" shown in the PLAN of the liner in fig.1 Appendix-IX, no sample liner shall reveal any internal cavities when examined visually or with the help of a magnifying glass, for acceptance of the lot.	No comments/Suggestions from approved/ developmental vendors has been received	No change	7.5 **Internal cavity test:** Five sample liners per lot shall be checked for internal cavities. On sectioning along "y-y" shown in the PLAN of the liner in fig.1 Appendix-XI, no sample liner shall reveal any internal cavities when examined visually or with the help of a magnifying glass, for acceptance of the lot.
		7.6 **Dimensional check:** (i) Dimensional checking shall be done with approved inspection gauges as per RDSO drawings. For acceptance,	No comments/Suggestions from approved/	No change	7.6 **Dimensional check:** i) Dimensional checking shall be done with approved inspection gauges as per RDSO drawings. For acceptance, each sample liner should pass the

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		each sample liner should pass the requirement of the gauges. Sampling shall be done as per 7.6.1 (ii). (ii) **Sampling:** (a) 2% liners per lot shall be checked for dimensions in the first 1,00,000 liners of one design manufactured by a firm. (b) 0.5% liners per lot shall be checked for dimensions consequent to 1,00,000 liners of one design being found satisfactory. In case, any lot is rejected for dimensions, 2% liners per lot shall be checked from next lot onwards till 1,00,000 liners (in one or more lots) are found satisfactory, and thereafter the sampling rate shall be 0.5% per lot again.	developmental vendors has been received		requirement of the gauges. Sampling shall be done as per 7.6.1 (ii). (ii) **Sampling:** (a) 2% liners per lot shall be checked for dimensions in the first 1,00,000 liners of one design manufactured by a firm. (b) 0.5% liners per lot shall be checked for dimensions consequent to 1,00,000 liners of one design being found satisfactory. In case, any lot is rejected for dimensions, 2% liners per lot shall be checked from next lot onwards till 1,00,000 liners (in one or more lots) are found satisfactory, and thereafter the sampling rate shall be 0.5% per lot again.
		7.7 **Percent water absorption test:** (i) Three sets, each set consisting of 10 liners, shall form the sample for this test. Average weight of each set shall be considered individually as weight of liner after conditioning. (ii) For calculation of percent water absorption of liners, the dry weight of liners shall be the average weight of 10 liners, as in para 6 and retained by the manufacturer before conditioning. (iii) For acceptance of the lot, the percent water absorption for the three sets considered individually shall not be less than 3% for GFN liner and shall not be less than 1.6 % for HVN liner when calculated in the manner given in Appendix IV.	Comments of i) M/s Polyset Plastics Pvt. Ltd.:	Para has been modified. Detailed Remarks at Annexure-I	7.7 **Percent water absorption test**(for GFN Liners only): (i) For water absorption test, 10 nos. of 'as-moulded' GFN liners from each lot or part thereof produced from all cavities used for production shall be preserved by the manufacturer for determination of dry weight of the liners. (ii)Three sets, each set consisting of 10 liners, shall form the sample for this test. Average weight of each set shall be considered individually as weight of liner after conditioning. (iii) For calculation of percent water absorption of liners, the dry weight of liners shall be the average weight of 10 liners, as in para 6 and retained by the manufacturer before conditioning. (iv) For acceptance of the lot, the percent water absorption for the three sets considered individually shall not be less than 3% for GFN liner ~~and shall not be less than 1.6 % for HVN liner~~ when calculated in the manner given in Appendix IV.
		7.8 **Cross- breaking load test:** Three samples of GFN liners per lot shall be tested and accepted as explained in clause 5.2.2 above.	No comments/Suggestions from approved/ developmental vendors has been received	Para has been modified. Detailed Remarks at Annexure-I	7.8 **Cross- breaking load test:** (for GFN Liners only) Three samples of GFN liners per lot shall be tested and accepted as explained in clause 5.2.2 above.
		7.9 **Viscosity Number:**	Comments of	Para has been	7.9 **Viscosity Number:** (for HVN Liners only)

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		Three sample liners per lot shall be checked for viscosity number. For acceptance of the lot each individual value on the three sample liners shall not be less than 230 cm^3/g.	i) M/s Black Burn & Co. Pvt. Ltd. :	modified. Detailed Remarks at Annexure-I	Three sample liners per lot shall be checked for viscosity number. For acceptance of the lot each individual value on the three sample liners shall not be less than 230 cm^3/g.
		7.10 **Surface roughness:** **T**hree sample liners per lot shall be checked for surface roughness. For acceptance of the lot each individual value on the three sample liners shall be within 0.1-0.2 Ra.	No comments/Suggestions from approved/ developmental vendors has been received	No change	7.10 **Surface roughness:** (for HVN Liners only) **T**hree sample liners per lot shall be checked for surface roughness. For acceptance of the lot each individual value on the three sample liners shall be within 0.1-0.2 Ra.
		7.11 **Flexural Strength test:** The flexural strength of five tests specimen shall be tested as detailed in Appendix- X.	Comments of i) M/s Black Burn & Co. Pvt. Ltd. , ii) M/s Adinath Industries & iii)M/s Parasnath Enterprises:	Para has been deleted. Detailed Remarks at Annexure-I	~~7.11 **Flexural Strength test:**~~ ~~The flexural strength of five tests specimen shall be tested as detailed in Appendix- X.~~
		7.12 **Finger Printing of Chemical Composition:** Finger printing of the chemical composition of HVN & GFN liner shall be done by measuring the values of Specific Gravity and Melting Point which shall not vary from initial approved values and specified tolerance duly communicated to the firm at the time of fresh registration so that there will be no major change in composition of HVN & GFN Liner in regular supply. i) Specific Gravity – Approved value + 0.02 Subject to not beyond the specified limits. ii) Melting point- – Approved value + 2 Subject to not beyond the specified limits.	Comments of i) M/s UNIQUE PLASTIC INDUSTRIES, ii) M/s Black Burn & Co. Pvt. Ltd., iii)M/s MOULDED FIBREGLASS PRODUCTS, iv)M/s Adinath Industries, v) M/s Parasnat Enterprises & vi)M/s Polyset Plastics Pvt. Ltd. :	Para has been deleted. Detailed Remarks at Annexure-I	~~7.12 **Finger Printing of Chemical Composition:**~~ ~~Finger printing of the chemical composition of HVN & GFN liner shall be done by measuring the values of Specific Gravity and Melting Point which shall not vary from initial approved values and specified tolerance duly communicated to the firm at the time of fresh registration so that there will be no major change in composition of HVN & GFN Liner in regular supply.~~ ~~i) Specific Gravity – Approved value + 0.02~~ ~~Subject to not beyond the specified limits.~~ ~~ii) Melting point- – Approved value + 2~~ ~~Subject to not beyond the specified limits.~~

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			New Para added	HVN liners has to supply with the fixed RAL colour and matching of colour shade of moulded liners with RAL colour shade manually, will lead to human error. Hence a new clause RAL colour test has been added.	**7.11 RAL Colour Test:** (for HVN Liners only) Three sample liners per lot shall be checked for RAL colour shade of moulded HVN Liners. For acceptance of the lot each individual RAL number of the three sample liners shall conform with the requirement given in clause 4.1.2.
8.0	**RE-TEST**	8.1 Should any of the test ~~specimen~~ sample fail in either melting point or specific gravity or Glass filler percent/ Ash content percent, no re-testing shall be undertaken and lot shall stand rejected.	No comments/Suggestions from approved/ developmental vendors has been received	No change	8.1 Should any of the test sample fail in in following tests, no re-testing shall be undertaken and lot shall stand rejected. i. Melting point or Specific gravity or Glass filler percent for GFN liner i. Viscosity No. or Melting point or Specific gravity or Ash content percent for HVN liner
		8.2 Should only one test sample fail in Hardness or internal cavity or cross breaking load or viscosity number or surface roughness, twice the number of samples drawn earlier for testing, shall be tested for that particular test in which the earlier sampled failed. In this re-testing all the samples should pass the test value for acceptance of the lot represented by these samples otherwise the	No comments/Suggestions from approved/ developmental vendors has been received	No change	8.2 Should only one test sample fail in following tests, twice the number of samples drawn earlier for testing, shall be tested for that particular test in which the earlier sampled failed. In this re-testing all the samples should pass the test value for acceptance of the lot represented by these samples otherwise the entire lot shall be rejected. i. Hardness or internal cavity or cross breaking load for GFN Liners or Hardness or internal cavity or Viscosity number or surface roughness or

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		entire lot shall be rejected.			Colour test for HVN Liners
		8.3 Should any one test sample fail in dimensions, the manufacturer may re-offer the liners lot wise only once after sorting out the defectives, with written permission of the inspecting authority. The re-offered lot shall be inspected for all tests in terms of acceptance test clause 7. If the reoffered lot fails again in dimensions, entire lot shall be rejected.	No comments/Suggestions from approved/ developmental vendors has been received	No change	8.3 Should any one test sample fail in dimensions, the manufacturer may re-offer the liners lot wise only once after sorting out the defectives, with written permission of the inspecting authority. The re-offered lot shall be inspected for all tests in terms of acceptance test clause 7. If the reoffered lot fails again in dimensions, entire lot shall be rejected.
		8.4 Should the liners fail in percentage water absorption, the liners may be re-conditioned and re-offered for inspection only once, with written permission of the inspecting authority. The re-offered lot shall be inspected for all tests in terms of acceptance test clause 7. If the reoffered lot fails again in percentage water absorption , entire lot shall be rejected.	No comments/Suggestions from approved/ developmental vendors has been received	No change	8.4 Should the GFN liners fail in percentage water absorption, the liners may be re-conditioned and re-offered for inspection only once, with written permission of the inspecting authority. The re-offered lot shall be inspected for all tests in terms of acceptance test clause 7. If the reoffered lot fails again in percentage water absorption , entire lot shall be rejected.
9.0	**FINAL INSPECTION/TESTING AND DOCUMENTATION**	The manufacturer shall carry out the final inspection and testing internally in accordance with the plan of testing given under the acceptance test clause and shall maintain the records as per Appendix V to Appendix VII, to ensure that the liners have passed the inspection criteria.	No comments/Suggestions from approved/ developmental vendors has been received	No change	The manufacturer shall carry out the final inspection and testing internally in accordance with the plan of testing given under the acceptance test clause and shall maintain the records as per Appendix V to Appendix VII, to ensure that the liners have passed the inspection criteria.
10	**PACKING**	10.1 The liner shall be packed in multiple of 100 nos., in black color polybags / gunny bags so as to avoid loss or damage during transit and 3 to 5 nos. of these polybags / gunny bags shall be put in sturdy corrugated box as per IS:7151-91 and sealed.	No comments/Suggestions from approved/ developmental vendors has been received	No change	10.1 The liner shall be packed in multiple of 100 nos., in black color polybags / gunny bags so as to avoid loss or damage during transit and 3 to 5 nos. of these polybags / gunny bags shall be put in sturdy corrugated box as per IS:7151-91 and sealed.
		10.2 For transportation by road, the sealed cartons containing the liners shall be transported in a vehicle exclusively for the liners and no other consignments shall be loaded with the liners in the same vehicle.	Comments of i) M/s Industrial Components Industries, ii) M/s Polymer Products	Para has been kept unchanged. Detailed	For transportation by road, the sealed cartons containing the liners shall be transported in a vehicle exclusively for the liners and no other consignments shall be loaded with the liners in the same vehicle.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)
			Of India, iii)M/s Black Burn & Co. Pvt. Ltd., iv)M/s Moulded Fibreglass Products, v) M/s Adinath Industries & vi)M/s Parasnath Enterprises	Remarks at Annexure-I	
11	**TEST FACILITIES**	The liner manufacturer shall be required to install all the necessary test facilities for inspection of liners in a separate well lit, clean and properly ventilated laboratory room provided with easily maintainable floor and platform.	Comments of i) M/s Industrial Components Industries & ii) M/s Polymer Products Of India	Para has been kept unchanged. Detailed Remarks at Annexure-I	The liner manufacturer shall be required to install all the necessary test facilities for inspection of liners in a separate well lit, clean and properly ventilated laboratory room provided with easily maintainable floor and platform.
12	**INSPECTION GAUGES**	The inspection gauges for dimensional check shall conform to RDSO drawings. The manufacturer shall submit two sets of inspection gauges for the approval of inspecting authority. One set shall be used as 'Master gauge' and shall be preserved safely by the liner manufacturer. The second set shall be for use by the inspecting official. For internal quality control, the firm should use an additional set of gauges as per drawing.	No comments/Suggestions from approved/ developmental vendors has been received	No change	The inspection gauges for dimensional check shall conform to RDSO drawings. The manufacturer shall submit two sets of inspection gauges for the approval of inspecting authority. One set shall be used as 'Master gauge' and shall be preserved safely by the liner manufacturer. The second set shall be for use by the inspecting official. For internal quality control, the firm should use an additional set of gauges as per drawing.
13	**DISPOSAL OF REJECTED LINERS**	The rejected liners shall be out into pieces and made un-usable.	No comments/Suggestions from approved/ developmental vendors has been received	No change	The rejected liners shall be out into pieces and made un-usable.
14	**REPORT**	The inspection official shall report the test observations in the format of Appendix V to VII.	No comments/Suggestions from approved/ developmental vendors has been received	No change	The inspection official shall report the test observations in the format of Appendix V to VII.
15	**GENERA**	15.1 The liner manufacturer shall furnish at his cost, the	No	No change	15.1 The liner manufacturer shall furnish at his cost, the liners

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
<tr><td></td><td>L</td><td>liners required for all tests and shall provide necessary manpower and facilities for carrying out tests at his cost.</td><td>comments/Suggestions from approved/ developmental vendors has been received</td><td></td><td>required for all tests and shall provide necessary manpower and facilities for carrying out tests at his cost.</td></tr>
<tr><td></td><td></td><td>15.2 Purchaser/inspecting officer or his representative shall have free access to the works of the manufacturer at all reasonable times and shall be at liberty to inspect the manufacture at any stage and to call for records, pertaining to manufacture which shall be made available to him within reasonable time.</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>15.2 Purchaser/inspecting officer or his representative shall have free access to the works of the manufacturer at all reasonable times and shall be at liberty to inspect the manufacture at any stage and to call for records, pertaining to manufacture which shall be made available to him within reasonable time.</td></tr>
<tr><td></td><td></td><td>15.3 Type tests may be repeated at any stage during currency of the contract, at the discretion of the inspecting authority.</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>15.3 Type tests may be repeated at any stage during currency of the contract, at the discretion of the inspecting authority.</td></tr>
<tr><td></td><td></td><td>15.4 The material shall be offered for inspection as per call letter given in appendix VIII.</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>15.4 The material shall be offered for inspection as per call letter given in appendix VIII.</td></tr>
<tr><td colspan="2">APPENDIX-I</td><td>SCHEME OF TESTING FOR ACCEPTANCE TESTS
(A) TYPE TESTS
<table>
<tr><th>S. No.</th><th>Property</th><th>No. of samples to be tested</th><th>Criteria value for acceptance /rejection</th><th>No. of samples to be drawn</th></tr>
<tr><td>1</td><td>Tensile strength</td><td>5</td><td>Individual</td><td>7</td></tr>
<tr><td>2</td><td>Elongation at break</td><td>5</td><td>Individual</td><td>-</td></tr>
<tr><td>3</td><td>Cross breaking strength</td><td>5</td><td>Average</td><td>7</td></tr>
<tr><td>4</td><td>Di-electric strength</td><td>3</td><td>Individual</td><td>3</td></tr>
<tr><td>5</td><td>Volume resistivity</td><td>3</td><td>-do-</td><td>3</td></tr>
<tr><td>6</td><td>Hardness</td><td>3</td><td>-do-</td><td>3</td></tr>
<tr><td>7</td><td>Melting point</td><td>3</td><td>-do-</td><td>-</td></tr>
<tr><td>8</td><td>Specific gravity</td><td>3</td><td>-do-</td><td>-</td></tr>
</table></td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>Test for HVN Liner has been added.</td><td>APPENDIX-I
(IRS-T-44-2023)

SCHEME OF TESTING FOR ACCEPTANCE TESTS
(A) TYPE TESTS
<table>
<tr><th>S. No.</th><th>Property</th><th>No. of samples to be tested</th><th>Criteria value for acceptance /rejection</th><th>No. of samples to be drawn</th></tr>
<tr><td>1</td><td>Tensile strength</td><td>5</td><td>Individual</td><td>7</td></tr>
<tr><td>2</td><td>Elongation at break</td><td>5</td><td>Individual</td><td>-</td></tr>
<tr><td>3</td><td>Cross breaking strength</td><td>5</td><td>Average</td><td>7</td></tr>
<tr><td>4</td><td>Di-electric strength</td><td>3</td><td>Individual</td><td>3</td></tr>
<tr><td>5</td><td>Volume resistivity</td><td>3</td><td>-do-</td><td>3</td></tr>
<tr><td>6</td><td>Hardness</td><td>3</td><td>-do-</td><td>3</td></tr>
</table></td></tr>
</table>

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)

9	Glass filler	3	-do-	-

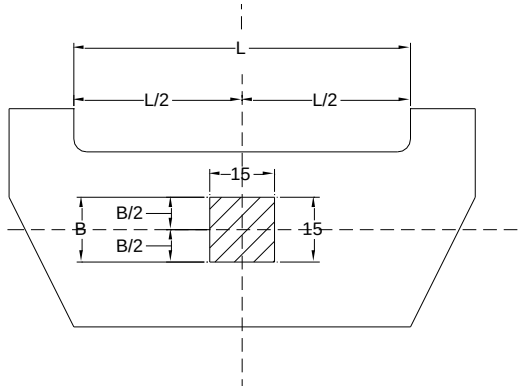
Note:(i) Tests at S.No.7, 8 & 9 shall be conducted on broken pieces after the tensile test.

(ii) Tensile strength and Elongation at break tests shall be conducted at speed of 5mm per minute.

(iii) Tensile strength & Elongation at break tests shall be done on the same samples.

(iv) Samples shall be signed by the firm's representative & the inspecting official drawing the samples.

(v) For tests at S.No.1 & 3, two extra samples have been shown to be drawn. These shall be used for setting the test equipment before final testing.



7	Melting point	3	-do-	-
8	Specific gravity	3	-do-	-
9	Glass filler/ Ash content	3	-do-	-
10	Flexural Modulus	3	-do-	-
11	Viscosity number	3	-do-	-

Note:

(i) Tests at S.No.7, 8 & 9 shall be conducted on broken pieces after the tensile test.

(ii) Tensile strength and Elongation at break tests shall be conducted at speed of 5mm per minute.

(iii) Tensile strength & Elongation at break tests shall be done on the same samples.

(iv) Samples shall be signed by the firm's representative & the inspecting official drawing the samples.

(v) For tests at S.No.1 & 3, two extra samples have been shown to be drawn. These shall be used for setting the test equipment before final testing.

(vi) Tests at S.No.10 & 11, shall be conducted only on HVN Liner

(B) PRODUCT TESTING

S. No.	Property	No. of samples to be tested	Criteria value for acceptance /rejection	No. of samples to be drawn
1	Cross-breaking load of GFN Liner	10	Individual	12
2	Melting point	3	-do-	-
3	Specific gravity	3	-do-	-
4	Glass filler/ Ash content	3	-do-	-
5	% water absorption	8	Average	8

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6	Hardness	3	Individual	3
7	Internal cavity test	3	-do-	3
8	Dimensions	8	-do-	8
9	Viscosity no.	3	-do-	3
10	Surface roughness	3	-do-	3
11	RAL colour test	3	-do-	3

Note:

(i) Tests at S. No. 2, 3, 4 shall be done on cut pieces of samples after internal cavity test (S. No. 7)

(ii) Test at S. No. 5 shall be done as per Appendix IV.

(iii) % water absorption test shall be ensured at firm's premises by the sample drawing authority before collection of samples.

(iv) Samples shall be signed by the firm's representative and the inspecting official drawing the samples.

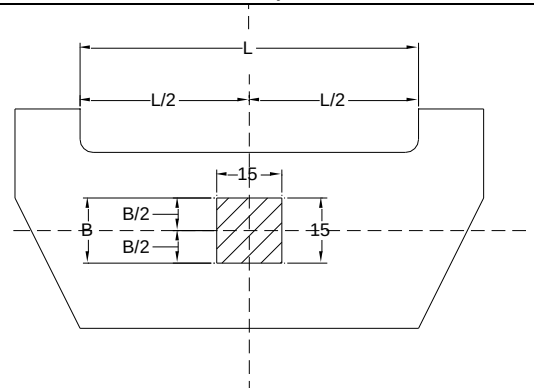
(v) For cross-breaking load test, 2 extra samples have been shown to be drawn. These shall be used for setting the test equipment before final testing.

(vi) Test piece for specific gravity shall be taken from middle portion of the liner.

(vii) Test at S. No. 9 shall be done on cut pieces of samples of HVN liner after internal cavity test (S.No. 7)

(viii) Test at S. No. 10 and 11 shall be done on the same samples of HVN liner before hardness test (S.No. 6).

"Test piece for specific gravity shall be taken from middle portion of liner as shown in the sketch"

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td><td> 
</td></tr>
<tr><td>APPENDIX-II</td><td></td><td>TEST FOR CROSS BREAKING LOAD OF GFN LINER
<s>1.</s> METHOD
1.1 The test shall be carried out as per IS:1998 with the following changes:
i) The liner will be tested in a manner as shown in <s>Fig.1</s> Appendix-IX
ii) The radius of support points and of loading point shall be 1.5 mm.
iii) The distance between the support points, rate of traverse of jaws of the testing machine and the acceptable value of cross-breaking load shall be as given in the table below:
<table><tr><td>S. No</td><td>Drawing No</td><td>Distance between support points(</td><td>Rate of traverse of jaws</td><td>Cross breaking load (min)</td></tr></table></td><td>Comments of
i) M/s Black Burn & Co. Pvt. Ltd.,
ii) M/s Adinath Industries &
iii) M/s Parasnath Enterprises:</td><td>Para has been modified. Detailed Remarks at Annexure-I</td><td>TEST FOR CROSS BREAKING LOAD OF GFN LINER
METHOD
1.1 The test shall be carried out as per IS:1998 with the following changes:
i) The liner will be tested in a manner as shown in Appendix-IX
ii) The radius of support points and of loading point shall be 1.5 mm.
iii) The distance between the support points, rate of traverse of jaws of the testing machine and the acceptable value of cross-breaking load shall be as given in the table below:
<table><tr><td>S.No</td><td>Drawing No</td><td>Distance between support points(x)</td><td>Rate of traverse of jaws</td><td>Cross breaking load (min)</td></tr><tr><td>(1)</td><td>(2)</td><td>(3)</td><td>(4)</td><td>(5)</td></tr><tr><td>1.</td><td>RDSO/T-2505</td><td>45mm</td><td>50mm/mt</td><td>360kg</td></tr><tr><td>2.</td><td>RDSO/T-3516</td><td>45mm</td><td>50 mm/mt</td><td>420kg</td></tr><tr><td>3</td><td>RDSO/T-</td><td>60mm</td><td>5 mm/mt</td><td>480kg</td></tr></table></td></tr>
</table>

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>x)</td><td></td><td></td></tr>
<tr><td>(1)</td><td>(2)</td><td>(3)</td><td>(4)</td><td>(5)</td></tr>
<tr><td>1.</td><td>RDSO/T-2505</td><td>45mm</td><td>50mm/mt</td><td>360kg</td></tr>
<tr><td>2.</td><td>RDSO/T-3516</td><td>45mm</td><td>50 mm/mt</td><td>420kg</td></tr>
<tr><td>3</td><td>RDSO/T-3702</td><td>60mm</td><td>5 mm/mt</td><td>480kg</td></tr>
<tr><td>4</td><td>RDSO/T-3706</td><td>60mm</td><td>5 mm/mt</td><td>390kg</td></tr>
<tr><td>5</td><td>RDSO/T-3707</td><td>60mm</td><td>5 mm/mt</td><td>720kg</td></tr>
<tr><td>6</td><td>RDSO/T-3708</td><td>60mm</td><td>5 mm/mt</td><td>960kg</td></tr>
<tr><td>7</td><td>RDSO/T-3723</td><td>45mm</td><td>5 mm/mt</td><td>600kg</td></tr>
<tr><td>8</td><td>RDSO/T-8751</td><td>60mm</td><td>5 mm/mt</td><td>490kg</td></tr>
<tr><td>9</td><td>RDSO/T-8752</td><td>60mm</td><td>5 mm/mt</td><td>760kg</td></tr>
<tr><td>10</td><td>RDSO/T-8753</td><td>60mm</td><td>5 mm/mt</td><td>1000kg</td></tr>
</table>
</td><td></td><td></td><td>
<table>
<tr><td></td><td>3702</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>RDSO/T-3706</td><td>60mm</td><td>5 mm/mt</td><td>390kg</td></tr>
<tr><td>5</td><td>RDSO/T-3707</td><td>60mm</td><td>5 mm/mt</td><td>720kg</td></tr>
<tr><td>6</td><td>RDSO/T-3708</td><td>60mm</td><td>5 mm/mt</td><td>960kg</td></tr>
<tr><td>7</td><td>RDSO/T-3723</td><td>45mm</td><td>5 mm/mt</td><td>600kg</td></tr>
<tr><td>8</td><td>RDSO/T-8751</td><td>60mm</td><td>5 mm/mt</td><td>490kg</td></tr>
<tr><td>9</td><td>RDSO/T-8752</td><td>60mm</td><td>5 mm/mt</td><td>760kg</td></tr>
<tr><td>10</td><td>RDSO/T-8753</td><td>60mm</td><td>5 mm/mt</td><td>1000kg</td></tr>
<tr><td>11</td><td>RDSO/T-6938</td><td>60mm</td><td>5 mm/mt</td><td>648kg</td></tr>
<tr><td>12</td><td>RDSO/T-6939</td><td>60mm</td><td>5 mm/mt</td><td>864kg</td></tr>
<tr><td>13</td><td>RDSO/T-8222</td><td>60mm</td><td>5 mm/mt</td><td>885kg</td></tr>
<tr><td>14</td><td>RDSO/T-8223</td><td>60mm</td><td>5 mm/mt</td><td>914kg</td></tr>
</table>
Note: For GFN liners other than those mentioned above, the CBL value shall be specified by RDSO as per requirement.
</td></tr>
<tr><td>APPENDIX-IIIA</td><td></td><td>A. GLASS FILLER CONTENT ~~CLEAR PERCENT~~
1. METHOD
1.1.Take a crucible and heat it by keeping in a muffle furnace till a constant weight is obtained of the crucible. Let its weight be = W_C
1.2 Take approximately 2 gm of the specimen of the GFN-66 liner in the above crucible and find the weight of the crucible and specimen as above. Lot combined weight =</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>A. GLASS FILLER CONTENT
1. METHOD
1.1. Take a crucible and heat it by keeping in a muffle furnace till a constant weight is obtained of the crucible. Let its weight be = W_C
1.2 Take approximately 2 gm of the specimen of the GFN-66 liner in the above crucible and find the weight of the crucible and specimen as above.
Lot combined weight = W_{CGN}</td></tr>
</table>

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)
		W_{CGN} 1.3 Then burn the nylon of the specimen by keeping the crucible in the muffle furnace till shining glass is noticed. Allow it to cool to the room temperature. 1.4 Then weigh the above crucible and glass after cooling. Let its combined weight be = W_{CG} **2 GLASS FILLER % CALCULATION** 2.1 Find out weight of GFN-66 specimen as: $W_{GN} = W_{CGN} - W_C$ 2.2 Find out weight of Glass filler as: $W_G = W_{CG} - W_C$ 2.3 Therefore, weight of Glass filler % = $\frac{WG}{W_{GN}} \times 100$			2.3 Then burn the nylon of the specimen by keeping the crucible in the muffle furnace till shining glass is noticed. Allow it to cool to the room temperature. 2.4 Then weigh the above crucible and glass after cooling. Let its combined weight be = W_{CG} **3 GLASS FILLER % CALCULATION** 2.4 Find out weight of GFN-66 specimen as: $W_{GN} = W_{CGN} - W_C$ 2.5 Find out weight of Glass filler as: $W_G = W_{CG} - W_C$ 2.6 Therefore, weight of Glass filler % = $\frac{WG}{W_{GN}} \times 100$
APPENDIX-IIIB		**B. ASH PERCENT of HVN LINER** **1. METHOD** 1.1. Take a crucible and heat it by keeping in a muffle furnace till a constant weight is obtained of the crucible. Let its weight be= W_1 1.2 Take approximately 2gms of the test specimen of the liner in the above crucible and find the weight of the crucible and test specimen. Let combined weight = W_2 1.3 Then burn the test specimen by keeping the crucible in the muffle furnace at 550 ± 50°C. Allow it to cool to the room temperature. 1.4 Then weigh the above crucible and ash after cooling. Let its combined weight be = W_3 **2. ASH % CALCULATION** Weight of nylon test specimen = W2–W1 Weight of Ash content = W3–W1 Therefore, % Ash content = $\frac{W3 - W1}{\text{----------}}$	No comments/Suggestions from approved/ developmental vendors has been received	No change	**B. ASH PERCENT of HVN LINER** **3. METHOD** 1.2. Take a crucible and heat it by keeping in a muffle furnace till a constant weight is obtained of the crucible. Let its weight be= W_1 1.2 Take approximately 2gms of the test specimen of the liner in the above crucible and find the weight of the crucible and test specimen. Let combined weight = W_2 1.5 Then burn the test specimen by keeping the crucible in the muffle furnace at 550 ± 50°C. Allow it to cool to the room temperature. 1.6 Then weigh the above crucible and ash after cooling. Let its combined weight be = W_3 **4. ASH % CALCULATION** Weight of nylon test specimen = W2–W1 Weight of Ash content = W3–W1

<table>
<tr><th colspan="2">SN / Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
<tr><td colspan="2"></td><td>$W2 - W_1$</td><td></td><td></td><td>Therefore, % Ash content = $\frac{W3 - W1}{W2 - W_1}$</td></tr>
<tr><td colspan="2">APPENDIX-IV</td><td>PERCENT WATER ABSORPTION (CONDITIONING)
1. PROCESS:
1.1 The GFN-66/ HVN-66 liners shall be immersed in boiling water in a water tank for 20 hours or as necessary after which the amount of water absorbed shall be checked.
1.2 The amount of water absorption may be checked by taking the weight (W_b) of 10 liners before and (W_a) after immersion in boiling water.
1.3 Water absorption %
$= \frac{W_a - W_b}{W_b} \times 100$</td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>PERCENT WATER ABSORPTION (CONDITIONING)
1. PROCESS:
1.1 The GFN-66/ HVN-66 liners shall be immersed in boiling water in a water tank for 20 hours or as necessary after which the amount of water absorbed shall be checked.
1.2 The amount of water absorption may be checked by taking the weight (W_b) of 10 liners before and (W_a) after immersion in boiling water.
1.3 Water absorption %
$= \frac{W_a - W_b}{W_b} \times 100$</td></tr>
<tr><td colspan="2">APPENDIX-V</td><td>Name of the firm: M/s.
Liner to Drg No.:
…….Railway's P.O No.:
Quantity on order:
Test results of
1. Internal Cavity
2. Cross Breaking Load
3. % Water absorption
4. Viscosity no.
5. Flexural strength
<table><tr><th>Lot No</th><th>Qty. in Nos</th><th>Internal cavity test</th><th>Cross breaking load test of GFN Liner</th><th>Water absorption test</th><th>Viscosity no. test for HVN Liner</th><th>Flexural Strength for HVN Liner</th></tr></table></td><td>Comments of
i) M/s Industrial Components Industries,
ii) M/s Polymer Products Of India,
iii) M/s Black Burn & Co. Pvt. Ltd.,
iv) M/s Adinath Industries &
v) M/s Parasnath Enterprises:</td><td>Para has been kept unchanged. Detailed Remarks at Annexure-I</td><td>Name of the firm: M/s.
Liner to Drg No.:
…….Railway's P.O No.:
Quantity on order:
Test results of
1. Internal Cavity
2. Cross Breaking Load
3. % Water absorption
4. Viscosity no.
~~5. Flexural strength~~ Colour Test</td></tr>
</table>

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
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<tr><th></th><th></th><th>Sample No</th><th>Free from Internal cavity Yes / No</th><th>Sample No.</th><th>Cross Breaking Load (Kg)</th><th>Sample No.</th><th>% water absorption</th><th>Sample No.</th><th>Viscosity No.</th><th>Sample No.</th><th></th></tr>
<tr><td>1</td><td>10000</td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td>1</td><td></td><td>1</td><td></td></tr>
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<tr><td></td><td></td><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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& so on
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<td></td><td></td>
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<table>
<tr><th rowspan="2">Lot No</th><th rowspan="2">Qty. in Nos</th><th colspan="2">Internal cavity Test GFN/HVN Liner</th><th colspan="2">Cross breaking load test of GFN Liner</th><th colspan="2">Water absorption Test for GFN Liner</th><th colspan="2">Viscosity no. test for HVN Liner</th><th colspan="2">~~Flexural Strength~~ Colour Test for HVN Liner</th></tr>
<tr><th>Sample No</th><th>Free from Internal cavity Yes / No</th><th>Sample No.</th><th>Cross Breaking Load (Kg)</th><th>Sample No.</th><th>% water absorption</th><th>Sample No.</th><th>Viscosity No.</th><th>Sample No.</th><th></th></tr>
<tr><td>1</td><td>10000</td><td>1</td><td></td><td>1</td><td></td><td>1</td><td></td><td>1</td><td></td><td>1</td><td></td></tr>
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& so on
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<tr>
<td>APPENDIX-VI</td><td></td>
<td>Name of the firm:
M/s
TEST RESULTS OF (1) Melting point
(2)Specific gravity
(3)Ash content&</td>
<td>No comments/Suggestions from approved/ developmental vendors has been received</td>
<td>No change</td>
<td>Name of the firm:
M/s
TEST RESULTS OF (1) Melting point
(2)Specific gravity
(3)Ash content&</td>
</tr>
</table>

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th><th>Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th></tr>
<tr><td colspan="2"></td><td>(4)Hardness
(5)Surface Roughness

(1) Liner to Drg. No.
(2) Qty. on order
(3) ….Railway's P.O. No

<table>
<tr><th>Lot No</th><th>Qty. in Nos.</th><th>Sample No.</th><th>Melting point ~~255-265°C~~</th><th>Specific gravity ~~1.10-1.16~~</th><th>Glass filler of GFN Liner/ Ash content of HVN Liner</th><th>Hardness ~~90~~ R(min)</th><th>Surface Roughgness HVN Liner</th></tr>
<tr><td>1</td><td>10,000</td><td>1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>2</td><td>10,000</td><td>1</td><td></td><td></td><td></td><td></td><td></td></tr>
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(5)Surface Roughness

(1) Liner to Drg. No.
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<tr><th>Lot No</th><th>Qty. in Nos.</th><th>Sample No.</th><th>Melting point ~~255-265°C~~</th><th>Specific gravity ~~1.10-1.16~~</th><th>Glass filler of GFN Liner/ Ash content of HVN Liner</th><th>Hardness ~~90~~ R(min)</th><th>Surface Roughness of HVN Liner</th></tr>
<tr><td>1</td><td>10,000</td><td>1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
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</table></td></tr>
<tr><td colspan="2">APPENDIX-VII</td><td>Name of the firms:
M/s

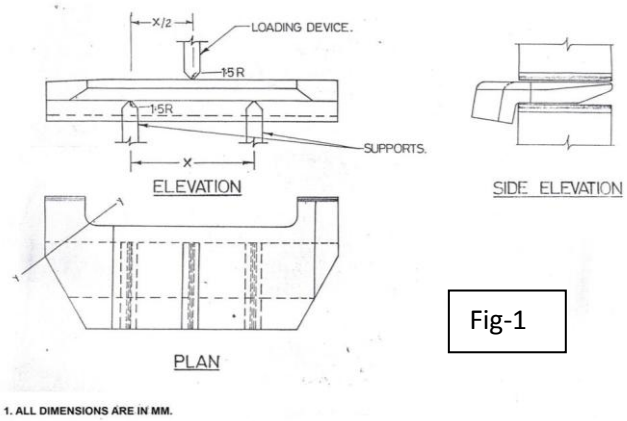
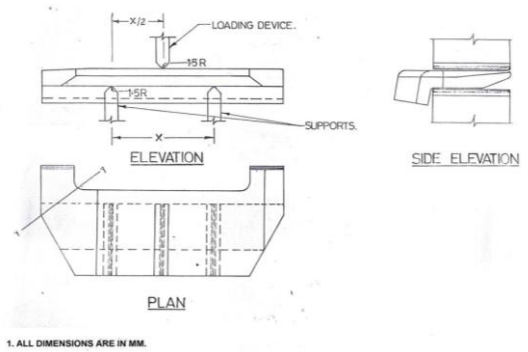
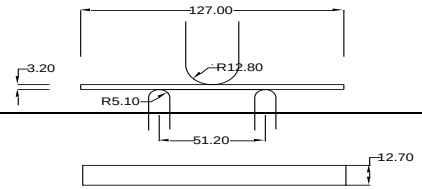
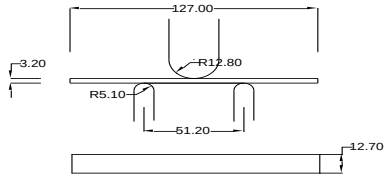
TEST RESILTS OF: DIMENSIONS
(1) Liner to Drg. No.
(2) Qty. on order:
(3) …Railway's P.O. No.

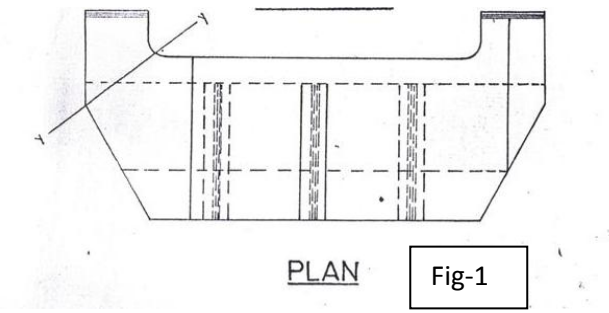
<table>
<tr><th>Lot No</th><th>Qty in nos.</th><th>Sample size</th><th>Dimensions</th></tr>
</table></td><td>No comments/Suggestions from approved/ developmental vendors has been received</td><td>No change</td><td>Name of the firms:
M/s

TEST RESILTS OF: DIMENSIONS
(1) Liner to Drg. No.
(2) Qty. on order:
(3) …Railway's P.O. No.

<table>
<tr><th>Lot No</th><th>Qty in nos.</th><th>Sample size</th><th>Dimensions</th></tr>
</table></td></tr>
</table>

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)
		<table><tr><td></td><td></td><td></td><td>As per gauges to drg. No</td><td>Failing in dimension</td></tr><tr><td>1</td><td>10,000</td><td>50</td><td>Satisfactory</td><td>-</td></tr></table>			<table><tr><td></td><td></td><td></td><td>As per gauges to drg. No</td><td>Failing in dimension</td></tr><tr><td>1</td><td>10,000</td><td>50</td><td>Satisfactory</td><td>-</td></tr></table>
APPENDIX-VIII		Letter of offer from the firm (Address of inspecting agency) Sub: Call letter for inspection of GFN-66/ HVN-66 insulating liner to drg. No. RDSO/T.. Ref: …Railway P.O. No…… dt….. for GFN-66 liner to drg. No. RDSO/T… GFN-66/ HVN-66 insulating liners as per following details are offered for inspection in terms of the above referred purchase order. These have been internally checked and found satisfactory as per drawing no. RDSO/T…. and relevant IRS specification. The test results are mentioned in the proforma as prescribed in the IRS specification. 1. Lot No. 2. Quantity on order (a) Against original order (b) Against extension 3. Quantity previously inspected and passed 4. Quantity now offered for inspection (a) Against original order (b) Against extension 5. Rate per liner 6. Marking on liner 7. Delivery period (a) Original (b) Extended (c) Letter No. (for extension) 8. Consignee 9. Consignee letter of authority No.	No comments/Suggestions from approved/ developmental vendors has been received	No change	Letter of offer from the firm (Address of inspecting agency) Sub: Call letter for inspection of GFN-66/ HVN-66 insulating liner to drg. No. RDSO/T.. Ref: …Railway P.O. No…… dt….. for GFN-66/HVN-6 liner to drg. No. RDSO/T… GFN-66/ HVN-66 insulating liners as per following details are offered for inspection in terms of the above referred purchase order. These have been internally checked and found satisfactory as per drawing no. RDSO/T…. and relevant IRS specification. The test results are mentioned in the proforma as prescribed in the IRS specification. 1. Lot No. 2. Quantity on order (c) Against original order (d) Against extension 3. Quantity previously inspected and passed 4. Quantity now offered for inspection (c) Against original order (d) Against extension 5. Rate per liner 6. Marking on liner 7. Delivery period (d) Original (e) Extended (f) Letter No. (for extension) 8. Consignee 9. Consignee letter of authority No. 10. Packing

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)
		10. Packing 11. Test certificate of raw material Thanking you, Yours faithfully, (Signature with date of the firm's authorized person)			11. Test certificate of raw material Thanking you, Yours faithfully, (Signature with date of the firm's authorized person)
APPENDIX-IX		**CROSS BREAKING LOAD TEST ARRANGEMENT**  Fig-1	No comments/Suggestions from approved/ developmental vendors has been received	No change	**CROSS BREAKING LOAD TEST ARRANGEMENT** 
APPENDIX-X		**FLEXURAL STRENGTH** The flexural strength of five tests specimen is to be carried out on a bar of rectangular cross section resting on two supports and loaded by means of a loading nose midway between the supports as shown in following figure.  	No comments/Suggestions from approved/ developmental vendors has been received	No change	**FLEXURAL STRENGTH** The flexural strength of five tests specimen is to be carried out on a bar of rectangular cross section resting on two supports and loaded by means of a loading nose midway between the supports as shown in following figure. 

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks	Final Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)
		Size of the test specimen will be 127mm length, 3.2 mm depth and 12.7mm width. The specimen is deflected until rupture occurs in the outer surface of the test specimen or until a maximum strain of 5% (maximum deflection 6.8 mm) is reached whichever occurs first. The procedure referred in ISO: 178:2010 or ASTM D-790-03 should be followed for conducting this test.			Size of the test specimen will be 127mm length, 3.2 mm depth and 12.7mm width. The specimen is deflected until rupture occurs in the outer surface of the test specimen or until a maximum strain of 5% (maximum deflection 6.8 mm) is reached whichever occurs first. The procedure referred in ISO: 178:2010 or ASTM D-790-03 should be followed for conducting this test.
			New Para	New Para added	**Appendix-XI** **(IRS-T-44-2023)** **Internal cavity test**  PLAN Fig-1

Annexure

Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision), Comments of firm and RDSO's remarks

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
1.0	Scope	This specification covers the requirements, method of tests and sampling for Glass filled Nylon-66 and High Viscous Nylon-66 insulating liners interposed between the rail and the Elastic Rail Clips in rail fastening assembly mainly to provide electrical insulation. All the provisions contained RDSO's ISO procedures laid down in Document No. QO-D-7.1-11 dated 19.07.2016 (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.	**Comments of M/s Industrial Components Industries:** QO−D−8.1−11 dated 30.11.2022 **Comments of M/s Polymer Products of India** To be corrected as QO−D−8.1−11 dated 30.11.2022	Comments of the firm have been accepted and Para has been modified.
4.0	**MANUFACTURE**	**4.1 Material**		
		4.1.2 **Material for HVN Liner**: The material used for the manufacture of Insulating Liners shall be "High Viscosity Nylon 66" as specified in RAL color standard mentioned in this clause or the relevant drawing Regenerated / reconstituted material shall not be used for the manufacture of liners. The manufacturer shall have a valid tie-up in the form of a written Memorandum of Understanding (MOU)/contract with primary raw material manufacturer for "Nylon 66 (HVN-66)" or other equivalent "Nylon 66 (HVN-66)", covering raw material supplies and technical support including quality control. The manufacturer of the insulating liners shall not	**Comments of M/s Okay Industries:** As per the table, the color specific to the drawing must be measured on a spectrometer with an acceptable range of Delta E (as per commission international de l' Eclairgeto or CIE) to be defined as per the RAL shade **Comments of M/s Carbonaire Industries (Madras) Pvt.Ltd.:** UV stabiliser material to be used. The time frame of UV stabilised material to be adviced (i.e) 400 hrs / 600 hrs etc. On this clarification, we can request the raw material supplier to ensure requisite additive of UV stabiliser be added in the base material HVN and a certificate can be	The comments of the firm has been considered, accordingly, Colour test in Para 7 has been added. The comments of the firm have been examined, in this regard, it is to mention that the test for UV stabilization is time consuming.. Therefore, this test is not included in the specification.

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<tr><td></td><td></td><td>change the constituents of the copolymer and shall only mould the liners out of the material supplied to them by the primary manufacturer.

During inspection of HVN Liner, the supplier should submit, the invoice alongwith e-way bill in support of procurement of raw material of particular grade from the primary raw material manufacturer with whom the written Memorandum of Understanding (MOU)/Contract has been signed.

Respective RAL color should be UV stabilized. Liner supplier has to submit the certificate of conformity for UV resistant property of the product material as well as the RAL colour as obtained from the primary raw material and RAL colour manufacturer.

<table>
<tr><th>S No.</th><th>Color</th><th>RAL</th><th>Liner Drg. No.</th></tr>
<tr><td>1</td><td>Brown Beige</td><td>1011</td><td>RT-3702</td></tr>
<tr><td>2</td><td>Traffic Red</td><td>3020</td><td>RT-3706</td></tr>
<tr><td>3</td><td>Heather Violet</td><td>4003</td><td>RT-3707</td></tr>
<tr><td>4</td><td>Grey Beige</td><td>1019</td><td>RT-3708</td></tr>
<tr><td>5</td><td>Emerald Green</td><td>6001</td><td>RT-6937</td></tr>
<tr><td>6</td><td>Signal Blue</td><td>5005</td><td>RT-6938</td></tr>
<tr><td>7</td><td>Saffron Yellow</td><td>1017</td><td>RT-6939</td></tr>
<tr><td>8</td><td>Coral Red</td><td>3016</td><td>RT-8751</td></tr>
<tr><td>9</td><td>Traffic Yellow</td><td>1023</td><td>RT-8752</td></tr>
<tr><td>10</td><td>Traffic Green</td><td>6024</td><td>RT-8753</td></tr>
</table></td><td>issued by the manufacturer that it meets the UV stabilisation of the material. Regarding, RAL color, UV stabilisation may not be required if the base raw material (HVN) which constitutes more than 95% of the product is UV stabilised. This is due to high cost of making RAL colors UV stabilised to ensure it meets the RAL color.

Comments of M/s UNIQUE PLASTIC INDUSTRIES :

UV Resistivity- Current there is no parameter mention for determination of the extent of UV resistive property requirement. How do we determine the authenticity of the extent of UV resistance property. How will this be monitored and adhered to ? What parameters are to be followed here ?

Comments of M/s CALSTAR STEEL LIMITED:

We shall request RDSO to inform the level of UV stabilization required.

Comments of M/s Black Burn & Co. Pvt. Ltd.:

a) It is not clear whether the manufacturer will be allowed to have a valid tie up in the form of MOU with more than one manufacturer of HVN 66. If yes, would he have to get all the applicable tests done for both materials?

b) What is meant by "other equivalent Nylon 66 (HVN-66)"?

c) During inspection of the liners, invoice supported by e waybill of raw material issued by primary raw material manufacturer has to be submitted. Will invoice issued by</td><td>Further, it is to mention that HVN liner has adequate part thickness to compensate for any reduction in mechanical properties due to UV exposure in their service life i.e. 200GMT or 4 years. Hence UV stabiliser material is not required.

Para has been modified.

Para has been modified.

Yes, manufacturer could have a valid tie up in the form of MOU with more than one primary manufacturer of HVN 66.

Yes, all the applicable tests done shall be done for both materials .

Deleted.
Para has been modified.

Yes, During inspection of the liners invoice supported by e waybill of raw material issued by primary raw material</td></tr>
</table>

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			authorized agent of the raw material manufacturer be acceptable? If yes, would any additional document be required to prove that the seller is an authorized agent of the raw material manufacturer?	manufacturer has to be submitted. In case of authorized agent, letter of authorization from the primary manufacturer of HVN 66 shall be submitted during the inspection.
			d) If two HVN Liner suppliers have MOU with the same primary raw material manufacturer, can they sell raw material to each other with documentary evidence that the same was purchased from the approved raw material source.	Yes,
			e) Addition of master batch to natural color HVN granules should be allowed for achieving RAL color.	Yes
			f) What is meant by "changing the constituents of the copolymer"? HVN is not a co polymer.	This line has been deleted.
			Comments of M/s Polyset Plastics Art. Ltd. : **Material for HVN Liner :-** This clause is asking for use of natural coloured HVN material (from the primary raw material manufacturer) and addition of a UV stabilized RAL colour master batch Unless a test method is mentioned in the STR for measurement of UV stability, any sub-standard or spurious material can be used and the objective of using HVN material will be lost. Unless a test method is mentioned in the STR for measurement of UV stability, any sub-standard or spurious material can be used and the objective of using HVN material will be lost. Measurement of UV stability is a long, time-consuming test. For example, if Indian Railways need minimum of 2500 hours of UV stability, the testing time would be more than 100 days for one vendor's sample. Practically, Indian	The comments of the firm has been examined, in this regard, it is to mention that the test for UV stabilization is time consuming. Therefore, this test is not included in the specification. Further, it is to mention that HVN liner has adequate part thickness to compensate for any reduction in mechanical properties due to UV exposure in their service life i.e 200GMT or 4 years. Hence UV stabiliser material is not required.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			Railways will not be able to ensure addition of UV master batch and this will provide an opportunity to vendors to not use UV master batch. Based on experience from railways who are using HVN material for liners, there is no need to use a UV master batch HVN liner is a robustly designed product and has adequate part thickness to compensate for any reduction in mechanical properties due to UV exposure. Other track components like the rail pads are also exposed to direct sunlight and still do not need any additional UV stabilization. We request for removal of the addition of UV stabilized colour master batch clause. Instead, it should be mentioned that colour-fast coloured master batchs should be used to give desired colours to the moulded HVN liners This clause is asking for manufacturing HVN liners in 10 different RAL shades. We request a re-consideration of this clause. Any red colour should be avoided on the rail track. The RAL colours should be limited to 3 or 4 colours, which have required light fastness. Based on our experience and detailed technical inputs from reputed colour master batch manufacturers we suggest the following colours which can be considered: Green RAL 6029 Blue RAL 5010 Beige RAL BOO 1 Brown RAL 8016 Yellow RAL 1023 From these colours, Indian Railways can consider three colours for 3 major types of liners for two different types of PSC sleepers. We are proposing the following scheme, as an example.	The para has been modified, accordingly, all the colours of single liner and combination liner used on track are kept same so that the field staff can easily understand use of different lines in the field. Hence,

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<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Sr. No</th><th>Colour</th><th>RA L</th><th>Liner Drg No.</th><th>Remarks</th></tr>
<tr><td>1</td><td>Natural</td><td>None</td><td>RT-3702</td><td>52 kg rail, PSC SleeperT-2495</td></tr>
<tr><td>2</td><td>Green</td><td>6029</td><td>RT-3706</td><td>60 kg rail, PSC Sleeper -2496</td></tr>
<tr><td>3</td><td>Blue</td><td>5010</td><td>RT-3707</td><td>52 kg rail , PSC SleeperT-2496</td></tr>
<tr><td>4</td><td>Beige</td><td>8001</td><td>RT-3708</td><td>52 kg rail , PSC Sleep erT-2496</td></tr>
<tr><td>5</td><td>Natural</td><td>None</td><td>RT6-937</td><td>141 / 136 RE rail, 141 RE Sleeper</td></tr>
<tr><td>6</td><td>Natural</td><td>None</td><td>RT-6938</td><td>60 kg rail, 141 RE Sleeper</td></tr>
<tr><td>7</td><td>Natural</td><td>None</td><td>RT-6939</td><td>60 kg rail, 141 RE Sleeper</td></tr>
<tr><td>8</td><td>Green</td><td>6029</td><td>RT-8751</td><td>60 kg rail , PSC SleeperT-8746</td></tr>
<tr><td>9</td><td>Blue</td><td>5010</td><td>RT-8752</td><td>52 kg rail , PSC Sleep er T-87 46</td></tr>
<tr><td>10</td><td>beige</td><td>8001</td><td>RT-8753</td><td>52 kg rail , PSC Sleep er T-87 46</td></tr>
</table>

This clause also asks for a valid tie-up with primary raw material manufacturer of HVN 66. It is important to define who can be considered as a primary raw material manufacturer.

We propose that a "primary raw material manufacturer" should be defined as a manufacturer of High Viscosity Nylon (Polyamide) 66, who has polymenzation plant facility to manufacture HVN 66 material starting from the precursor</td><td>The suggestion of the firm has been examined and the definition of the primary raw material manufacturer has been incorporated in this para.</td></tr>
</table>

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th></tr>
<tr><td></td><td></td><td></td><td>materials like Hexa Methylene Diamine (HMD) and I or Adipo Nitrile (ADN).

The "primary raw material manufacturer" should certify this information of them being primary raw material manufacture in their MOU with the vendor(s). The "primary raw material manufacturer" should also mention the grade of HVN 66 material they would supply to the vendor and the datasheet for the grade, in their MOU.

Comments of M/s Avadh Rail Infra Ltd.:

Details of UV stabilization test method and acceptance criteria should be define Colour measurement should on a spectrometer and measurement criteria should be define.</td><td>The comments of the firm has been examined, in this regard, it is to mention that the test for UV stabilization is time consuming. Therefore, this test is not included in the specification. Further, it is to mention that HVN liner has adequate part thickness to compensate for any reduction in mechanical properties due to UV exposure in their service life i.e 200GMT or 4 years. Hence UV stabiliser material is not required.</td></tr>
<tr><td></td><td></td><td>4.1.4 The physical properties of HVN-66 material used for the manufacture of nylon mouldings shall conform to the requirements given against. No. 1,2,3 & 10 of Table 1. Other properties as given in Table 1 refer to the as moulded test specimen of HVN-66 material.
<table>
<tr><th rowspan="2">S.No</th><th rowspan="2">Property</th><th rowspan="2">Units</th><th colspan="2">Acceptance Values</th><th rowspan="2">Test method</th></tr>
<tr><th>GFN Liner</th><th>HVN Liner</th></tr>
</table></td><td>Comments of M/s Industrial Components Industries & M/s Polymer Products Of India

Table–1, Sl. No.1: The test method BS:2782 Pt.1.1976, Method 123B or 123A as per RDSO EOI No. CT/EF/Policy/Global RFP/ HVN dated 05/03/2019

Table–1, Sl. No.2: The test method BS:2782 Pt.6.1980,</td><td>The relevant code has been. has been updated in the specification

The relevant Code has been updated for conducting Specific gravity test.</td></tr>
</table>

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks

1.	Melting point	°C	258-268	255-265	IS:5762-1970
2.	Specific gravity	-	1.38-1.43	1.10-1.16	BS EN ISO 1183-1:2019
3.	Glass filler/	%	33±2	--	Appendix IIIA
	Ash content		--	0.5 (max)	Appendix IIIB
4.	Hardness Rockwell	R	110(min)	100 (min)	ASTM D-785-08(2015)
5.	Tensile strength	Kg/mm^2	17.5(min)	7.0(min)	ASTM D-638-14
6.	Elongation at break	%	10 (max)	35 (min)	-do-
7.	Cross-breaking strength	Kg/mm^2	20.0(min)	--	IS:1998-1962 (Reaffirmed 2018)
8.	Dielectric strength	KV/mm	11(min)	11(min)	ASTM D-149-20
9.	Volume resistivity	Ohm. Cm	10^8(min)	10^{14}(min)	BS ISO 14309:2019
10.	Viscosity Number of raw material	cm^3/g	--	270 (min)	ISO 307
11.	Flexural Modulus	Kg/mm^2	--	250.0 (min)	ISO:178:2010 or ASTM: D

Method 620A as per RDSO EOI No. CT/EF/Policy/Global RFP/ HVN dated 05/03/2019

Table–1, Sl. No.9: The test method BS:2782 Pt.2.1982, Method 230A as per RDSO EOI No. CT/EF/Policy/Global RFP/ HVN dated 05/03/2019

Comments of M/s Okay Industries:

Table-1-As per the test method IS: 5762-1970, the melting point acceptable value may please be revised to 255-270 deg C as per standard.

Comments of M/s Carbonaire Industries (Madras) Pvt.Ltd. :
Melting point range to be 258° to 270° c.

Comments of M/s UNIQUE PLASTIC INDUSTRIES :

Table 1- point 1:
Current requirement- HVN-255-265 °C
Suggestion to enhance it to 258-268 °C.
Table 1 - Point 3:
Current requirement - HVN- 0.5% (Max), Suggested to be increased to 1% (max).

Comments of M/s CALSTAR STEEL LIMITED:

Tabl1-point-1
We shall request RDSO to allow a range of 263 ± 5°C as melting point of HVN
Tabl1-point-7:
We shall request RDSO to specially mention that the HVN liners should only bend and not show any sign of tear or

The relevant Code has been updated for method for conducting Volume resistivity.

The suggestion of the firms regarding Melting Point has been examined and minimum value 260°C has been kept with test method as per ISO 11357-3-2018

--do--

-do--

HVN is unfilled nylon, hence the suggestion of the firm is not accepted.

As per suggestions of the firm, melting point 268°C min. has been kept.

Cross breaking strength test has been deleted in the Table 2

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
		<table><tr><td></td><td></td><td></td><td></td><td></td><td>790</td></tr><tr><td>12</td><td>Surface roughness</td><td>Ra</td><td>--</td><td>0.1-0.2</td><td>IS :3073-1967 (Reaffirmed 2009)</td></tr></table>	breakage after cross breaking strength test. **Comments of M/s Black Burn & Co. Pvt. Ltd. :** **Tabl1-point-1** It is noticed that the test method has been changed for this property from BS 2782 pt.1. 1976 Method 123B or 123 A to IS:5762-1970. (Reaffirmed 2020). The test procedure appearing in IS: 5762-1970 is capillary tube method which was also followed earlier for GFN liners and was found to be not suitable. We request RDSO to review this as this test method depends on visual evaluation of melting point which can become a reason for dispute specially when the values are to be within close tolerance of finger printing value as is mentioned under clause 7.12 of specification. M/s Ascend are the largest manufacturers of PA66 in the world today and as per their data sheet, this test is done as per specification number ISO 11357-3-2018. Melting point as per the same is measured by DSC without any human interpretation and the values are also accurate. We suggest that the same may please be specified. Ascend's data sheet along with typical DSC melting point curve graph is attached. Although the graph is for PA6 but the same is attached just to indicate as to how sharply the melting point in this method can be measured without any human error. If DSC test method is adapted for HVN liners, the same may also please be adapted for GFN liners. Indian industry must upgrade its testing facilities to international standards in order to deliver world class products and make Make in India a successful mission. To the best of our knowledge, DuPont also follows this specification.	The physical properties of GFN & HVN Liners are made separately as Table 1A & Table 1B for more clarity. The range of melting point has been replaced with the minimum value of melting point. It is observed that the higher the melting point, better the properties of the Liner. During development of the product, it was observed that all the samples tested in RDSO were in higher range. Hence, in view of this, minimum melting point 260°C has been kept.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			It is not understood as to why the melting point range is broadened to 255-265 degree C from 258-265 degree C as was appearing earlier during Global RFP. As it is, the range of 258-265 degree C is wide and further widening the same may please be reviewed. **Tabl1-point-2:** It is not understood as to why the specific gravity range is broadened to 1.10-1.16 from 1.14-1.16 as was appearing earlier during Global RFP. For unfilled HVN liner, such broad range of specific gravity is not needed. **Tabl1-point-10:** Viscosity number is to be checked as per ISO 307. ISO 307 allows use of either 100% Formic Acid or 96% sulfuric acid as the solvent which should be used for the test. The values required are met by use of Sulfuric acid and therefore the same should also be mentioned besides just mentioning ISO 307 **Tabl1-point-9:** It is noticed that the test method has been changed for this property from BS 2782 pt.2-1982 Method 230A which was specified earlier during Global RFP to BS ISO 14309:2019. M/s Ascend are the largest manufacturers of PA66 in the world today and as per their data sheet, this test is done as per IEC 60093. We believe that DuPont also follows IEC 60093. Therefore, we request that the test method is changed to IEC 60093 and required value changed to 1013 as per Ascend's data sheet. **Comments of M/s MOULDED FIBREGLASS PRODUCTS:**	Specific gravity range of 1.10-1.16 is taken from same Global RFP of HVN liner. (Notice No. CT/EF/Policy/Global RFP/ HVN dated 05.03.2019) Ubbelohde viscometer with appropriate solvent (acid concentration) is to be used for testing of Viscosity number. The relevant Code has been updated for conducting Volume resistivity test.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			Tabl1-point-1: It is noticed that the test method has been changed for this property from BS 2782 pt.1. 1976 Method 123B or 123 A to IS: 5762-1970. (Reaffirmed 2020). The test procedure appearing in IS: 5762-1970 is capillary tube method which was also followed earlier for GFN liners and was found to be not suitable. We request RDSO to review this as this test method depends on visual evaluation of melting point which can become a reason for dispute especially when the values are to be within close tolerance of finger printing value as is mentioned under clause 7.12 of specification. M/s. Ascend Performance Materials are the largest manufacturers of PA66 in the world today and as per their data sheet, this test is done as per Specification Number ISO 11357-3- 2018. Melting point as per the same is measured by DSC without any human interpretation and the values are also accurate. We suggest that the same may please be specified. Ascend's data sheet along with typical DSC melting point curve graph is attached. Although the graph is for PA6 but the same is attached just to indicate as to how sharply the melting point in this method can be measured without any human error. If DSC test method is adapted for HVN liners, the same may also please be adapted for GFN liners. Indian industry must upgrade its testing facilities to international standards in order to deliver world class products and make Make in India a successful mission.	The physical properties of GFN & HVN Liners are made separately as Table 1A & Table 1B for more clarity. The range of melting point has been replaced with the minimum value of melting point. It is observed that the higher the melting point, better the properties of the Liner. During development of the product, it was observed that all the samples tested in RDSO were in higher range. Hence, in view of this, minimum melting point 260°C has been kept.

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th></tr>
<tr><td></td><td></td><td></td><td>To the best of our knowledge, DuPont also follows this specification.

It is not understood as to why the melting point range is broadened to 255-265 degree C from 258-265 degree C as was appearing earlier during Global RFP. As it is, the range of 258-265 degree C is wide and further widening the same may please be reviewed.

Tabl1-point-10:
Viscosity number is to be checked as per ISO 307. ISO 307 allows use of either 100% Formic Acid or 96% sulfuric acid as the solvent which should be used for the test. The values required are met by use of Sulfuric acid and therefore the same should also be mentioned besides just mentioning ISO 307

Tabl1-point-9:
It is noticed that the test method has been changed for this property from BS 2782 pt.2-1982 Method 230A which was specified earlier during Global RFP to BS ISO 14309:2019.

M/s Ascend are the largest manufacturers of PA66 in the world today and as per their data sheet, this test is done as per IEC 60093. We believe that DuPont also follows IEC 60093. Therefore, we request that the test method is changed to IEC 60093 and required value changed to 1013 as per Ascend's data sheet.

Comments of M/s Polyset Plastics Art. Ltd. :

<table><tr><td>S No.</td><td>Property</td><td>Units</td><td>Acceptable</td><td>Test Method</td></tr></table></td><td>An Ubbelohde viscometer with appropriate solvent (acid concentration) is to be used for testing of Viscosity number.

The relevant Code has been updated for conducting Volume resistivity test.

The range of melting point has been replaced with the minimum value of melting point. It is observed that the higher the melting point, better the</td></tr>
</table>

<table>
<tr><th>SN</th><th>Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th></tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>
<table>
<tr><td></td><td></td><td></td><td>Value(HVN Liners)</td><td></td></tr>
<tr><td>1</td><td>Melting Point</td><td>°C</td><td>255-265</td><td>IS:5762-1970</td></tr>
</table>
Our Comments:
The melting point is measured as per IS:5762-197O which is manual measurement and is subjected to human errors.
In the specification a range of values is given for melting point for HVN Liners which is 255-265'C.

Higher the meting point, better are the properties of the Liner.
In view of this, minimum temperature range should be specified.

We suggest to keep a mean value of 260°C (min) for melting point. If you still want to keep a range then the Acceptable values should be °C 255 – 270. It may be noted that most other properties in Table 1, given below, have either max or min values.

<table>
<tr><td>Sl. No.</td><td>Property</td><td>Acceptable Value</td></tr>
<tr><td>3</td><td>Ash Content</td><td>0.5 (max)</td></tr>
<tr><td>4</td><td>Hardness Rockwell (R)</td><td>100 (min)</td></tr>
<tr><td>5</td><td>Tensile Strength</td><td>7.0 (min)</td></tr>
<tr><td>6</td><td>Elongation at Break</td><td>35 (min)</td></tr>
<tr><td>8</td><td>Dielectric strength</td><td>11 (min)</td></tr>
<tr><td>9</td><td>Volume Resistivity</td><td>10^{14} (min)</td></tr>
<tr><td>10</td><td>Viscosity number of raw material</td><td>270 (min)</td></tr>
</table>
</td>
<td>properties of the Liner. During development of the product, it was observed that all the samples tested in RDSO were in higher range.

Hence, in view of this, minimum melting point 260°C has been kept.</td>
</tr>
</table>

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			11 | Flexural Modulus | 250.0 (min) **(viii) Avadh Rail Infra Ltd.:** Melting point should be 258 °C to 268 °C	minimum melting point 260°C has been kept.
		4.1.5 The conformity of physical properties of raw material to clause ~~4.1.2~~, 4.1.3 or 4.1.4, as applicable ~~either procured from sources who have been in the business of manufacturing & supplying 'Glass Filled Nylon 66 (GFN 66) Moulding Granules' or from other sources~~ shall be checked through outside independent agencies i.e. Government laboratory or from lab accredited by Accreditation agency as per extant guidelines issued by RDSO or National Test House or Regional Test Centre (RTC). For this purpose, raw material & samples (specifically prepared & sealed in the presence of RDSO officials) shall be sent to such labs / agencies for testing at firm's cost at a frequency of once in three years and /or in the event of change of raw material procurement source. The test report of such samples shall be directly sent to RDSO by such labs/agencies. After receipt of satisfactory report, raw material shall be permitted for use. Responsibility of using the passed raw material for manufacture of liners shall lie ~~on~~ with the firm. The records of raw material procurement, whatever the case may be, shall be maintained along with its consumption details and furnished to RDSO/ Railway Officials/Inspecting Authority as and when required by them. The responsibility of ensuring authenticity of all such records shall lie ~~on~~ with the firm.	**Comments of M/s Industrial Components Industries & M/s Polymer Products Of India**: For this purpose, raw material & samples (specifically prepared & sealed in the presence of RDSO officials) shall be sent to such labs / agencies for testing at firm's cost at a frequency of once in five years and /orin the event of change of raw material procurement source. **Comments of M/s Black Burn & Co. Pvt. Ltd. :** a) Format of raw material records to be maintained should be standardized. Would it need to be authenticated by the primary raw material manufacturer at an interval should be decided.	Comments of the firm have been not accepted and Para has been kept unchanged. Format of raw material is not a part of Specification. Accordingly, Para has been kept unchanged.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
	4.2 **MANUFACTURING PROCESS**	4.2.1 The glass filled nylon-66 and High viscous nylon-66 liners shall be manufactured by automatic screw type injection moulding machine. Raw Material must be preheated in Dehumidifier Chamber (with dew point - 30). Before molding moisture content should not be more than 0.2%.	**Comments of M/s Black Burn & Co. Pvt. Ltd. :** a) Dew point of minus 30 should be clarified as minus 30-degree C. Better to give a range such as -20 to - 30 degree C **Comments of M/s Adinath Industries & M/s Parasnath Enterprises:** a) Dew point range of Dehumidifier Chamber should be mentioned instead of single dew point of -30	As per suggestion of the firm, the range of temperature for Dehumidifier Chamber has been added.
		4.2.2 The liner shall be conditioned by immersing in boiling water for adequate time to ensure minimum 3% absorption for GFN Liner & minimum 1.6% absorption for HVN Liner of water as provided in para 7.7 (iii)	**Comments of M/s Polyset Plastics Pvt. Ltd.** This clause is redundant for HVN liners. Water conditioning, also called as annealing, was required for GFN liners, since GFN liners were very brittle. % elongation of GFN liner material is about 3-4%. In view of such low % elongation, GFN liners needed water conditioning to impart ductility (increased % elongation and impact strength). Whereas, % elongation of HVN 66 material is a minimum of 30-35%. With this kind of % elongation and corresponding impact strength, HVN 66 material does not need any water conditioning or annealing. Water conditioning is an energy consuming process where water is heated at about its boiling point 100°C and HVN 66 liners are immersed for prolonged time in boiling water. Exposure to boiling water exposes HVN 66 to hydrolysis, which affect its overall mechanical properties. This is totally avoidable. Therefore, water conditioning clause should be removed for HVN 66, altogether.	Comments of the firm has been accepted. Accordingly para has been modified.
5.0	**PRE ACCEPTANCE TESTS:**	5.1 **Type tests**: These tests shall be conducted on 'as moulded test specimen' as per scheme of testing given in Appendix I. The results of testing shall conform to the values given in Table 1.	**Comments of M/s Black Burn & Co. Pvt. Ltd. :** a) Test at Sr Nos 10,11 & 12 of Table 1 are not appearing under pre acceptance tests. Any reason?	Comments of the firm have been accepted and Para has been modified.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
6.0	**ACCEPTANCE TESTS**	**6.1 Lot size:** For purpose of inspection of the liners, 10,000 nos. of liners or part thereof duly conditioned shall form a lot.	**Comments of M/s Polymer Products Of India:** **Lot size:** For purpose of inspection of the liners, 20,000 nos. of liners or part thereof duly conditioned shall form a lot.(Quantity in lakhs is to be procured)	Comments of the firm have been not accepted and Para has been kept unchanged.
7.0	**TESTS**	7.7 **Percent water absorption test:** (i) Three sets, each set consisting of 10 liners, shall form the sample for this test. Average weight of each set shall be considered individually as weight of liner after conditioning. (ii) For calculation of percent water absorption of liners, the dry weight of liners shall be the average weight of 10 liners, as in para 6 and retained by the manufacturer before conditioning. (iii) For acceptance of the lot, the percent water absorption for the three sets considered individually shall not be less than 3% for GFN liner and shall not be less than 1.6 % for HVN liner when calculated in the manner given in Appendix IV.	**Comments of M/s Polyset Plastics Pvt. Ltd.:** With refence to clause 4.2.2 explanation, this clause should be eliminated completely.	Annealing/Conditioning of liner is required for GFN Liner as it is reinforced with 33% glass. GFN with 33% glass is a brittle material with low % elongation. However, HVN liner is unfilled material with high % elongation. HVN is not breakable. Hence Annealing/Conditioning of HVN Liner is not required. It also helps to reduced indent mark on the liner. Comments of the firm have been accepted and Para has been modified.
		7.9 **Viscosity Number:** Three sample liners per lot shall be checked for viscosity number. For acceptance of the lot each individual value on the three sample liners shall not be less than 230 cm^3/g.	**Comments of M/s Black Burn & Co. Pvt. Ltd. :** Viscosity number is to be checked as per ISO 307. ISO 307 allows use of either 100% Formic Acid or 96% sulfuric acid as the solvent which should be used for the test. The values required are met by use of Sulfuric acid and therefore the same should also be mentioned besides just mentioning ISO 307	An Ubbelohde viscometer with appropriate solvent (acid concentration) is to be used for testing of Viscosity number.
		7.11 **Flexural Strength test:** The flexural strength of five tests specimen shall be tested as detailed in Appendix- X.	**Comments of M/s Black Burn & Co. Pvt. Ltd. :** All the tests falling under Clause 7 are to be conducted on conditioned liners. How can Flexural Strength test as given in Appendix X be conducted on liners? This test is to be conducted on rectangular bar specimen which must be	Comments of the firm have been accepted and Para has been removed.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			specifically made for this test. Flexural modulus test is already appearing under Sr No 11 of table 1. Thus, there appears to be no need for this test **Comments of M/s Adinath Industries & M/s Parasnath Enterprises:** Flexural strength test not possible in HVN Liner. So, this test should be omitted.	
		7.12 **Finger Printing of Chemical Composition:** Finger printing of the chemical composition of HVN & GFN liner shall be done by measuring the values of Specific Gravity and Melting Point which shall not vary from initial approved values and specified tolerance duly communicated to the firm at the time of fresh registration so that there will be no major change in composition of HVN & GFN Liner in regular supply. i) Specific Gravity – Approved value + 0.02 Subject to not beyond the specified limits. ii) Melting point- – Approved value + 2 Subject to not beyond the specified limits.	**Comments of M/s UNIQUE PLASTIC INDUSTRIES:** **Melting Point –** Current deviation provided-(+) 02°C, Suggested to be enhanced to (+/-) 03°C, (Being within specified limits.) **Specific Gravity-** Current Deviation- (+) 0.02, Suggested to be enhanced to- (+/-) 0.02. (Being within specified limits. **Comments of M/s Black Burn & Co. Pvt. Ltd. & M/s MOULDED FIBREGLASS PRODUCTS:** a) Specific gravity should not be a part of finger printing as it varies with processing conditions like Injection pressure, hold on pressure, melt temperature, gate size, gate locations and on initial moisture content in the material. For thicker liners, the processing conditions used are much different than thinner liners. b) Can a vendor have multiple MOUS with different raw material manufacturers and thus have different finger printing values for different MOUs?	The insulating liners manufacturer have to mould the liners out of the material supplied to them by the primary manufacturer. The manufacturer cannot change the composition of raw material during moulding. Further, viscosity number test for raw material as well as on product has been included for HVN Liner, which restrict the manufacturer to manipulate with the raw material. Specific Gravity varies with the processing condition. Accordingly, the common Specific Gravity for all type of liner cannot be fixed. Melting Point is a basic property of Nylon. In view of above, Finger printing for HVN /GFN Liner is not required, hence para deleted.

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			c) We request that the range of value for finger printing of melting point be revised from -0/+2 to +/- 2 degree C and that too when the test method for melting point checking is also changed to DSC method which is the only test method which gives accurate reading without any human interpretation and is followed worldwide by all the reputed manufacturers of HVN raw materials. Otherwise, finger printing clause for Melting point should be deleted because it is very debatable whether such level of measuring accuracy can be obtained using IS: 5762-1970. d) How would the inspecting authority know as to what are the finger printing values? Which document of RDSO would reflect the same? **Comments of M/s Adinath Industries & M/s Parasnat Enterprises:** Finger printing of Chemical composition: - **i)** It is not possible to finger printing specific gravity as **it** varies with parameter setting like temperature, Injection pressure, hold on pressure, mould designing like gate size and gate location etc. Hence range of **specific** gravity should be mentioned. **ii)** Melting point vary between different raw material manufacturer as the different process, machines and raw material used by them to achieve the parameter. Technical data sheet is also different between them. So, range of melting point should be implemented. **Comments of M/s Polyset Plastics Pvt. Ltd. :** Two properties are being measured for finger printing of	Finger printing para has been removed. Finger printing para has been removed

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
			HVN material Specific Gravity which is a physical property and Melting point which is a thermal property. HVN is a type of Nylon 66 (or Polyamide 66) material. Any kind of Nylon 66 (PA66) material would pass the two tests viz, Specific Gravity and Melting Point listed here. The only difference between HVN and other PA66 material is viscosity number. Therefore, viscosity number should be specified as a required property for finger printing of HVN material.	
10	**PACKING**	10.2 For transportation by road, the sealed cartons containing the liners shall be transported in a vehicle exclusively for the liners and no other consignments shall be loaded with the liners in the same vehicle.	**Comments of M/s M/s Industrial Components Industries & M/s Polymer Products Of India:** For transportation by road, the sealed cartons containing the liners shall be transported in an exclusive vehicle for the liners. In case a lot consists ofsmall quantity the liners can be loaded with other consignments in the same vehicle. **Comments of M/s Black Burn & Co. Pvt. Ltd. & M/s MOULDED FIBREGLASS PRODUCTS:** It is not practical when a full truck load is not there. **Comments of M/s Adinath Industries & M/s Parasnath Enterprises:** For transportation it is always not possible to send sealed cartons liners exclusively in one vehicle. sometimes material also very less to send in one single vehicle. Hence part load should be permitted	Comments of firm are not accepted. Accordingly Para has been kept unchanged. Comments of firm are not accepted. Accordingly Para has been kept unchanged. Comments of firm are not accepted. Accordingly Para has been kept unchanged.
11	**TEST FACILITIES**	The liner manufacturer shall be required to install all the necessary test facilities for inspection of liners in a separate well lit, clean and properly ventilated laboratory room provided with easily maintainable floor and platform.	**Comments of M/s Industrial Components Industries & M/s Polymer Products Of India** Test Facilities – The liner manufacturer shall be required to	Comments of firm are not accepted. Accordingly Para has been kept unchanged.

<table>
<tr><th>SN</th><th>Para</th><th><u>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</u></th><th>Comments of Stake holders</th><th>RDSO's Remarks</th></tr>
<tr><td></td><td></td><td></td><td>install all the necessary test facilities for inspection of liners in a well–lit, clean, and properly ventilated laboratory room provided with easilymaintainable floor and platform.</td><td></td></tr>
<tr><td colspan="2">APPENDIX-II</td><td>TEST FOR CROSS BREAKING LOAD OF GFN LINER
~~1.~~ METHOD
1.1 The test shall be carried out as per IS:1998 with the following changes:
i) The liner will be tested in a manner as shown in ~~Fig.1~~ Appendix-IX
ii) The radius of support points and of loading point shall be 1.5 mm.
iii) The distance between the support points, rate of traverse of jaws of the testing machine and the acceptable value of cross-breaking load shall be as given in the table below:
<table><tr><th>S. No</th><th>Drawing No</th><th>Distance between support points(x)</th><th>Rate of traverse of jaws</th><th>Cross breaking load (min)</th></tr><tr><td>(1)</td><td>(2)</td><td>(3)</td><td>(4)</td><td>(5)</td></tr><tr><td>1.</td><td>RDSO/T-2505</td><td>45mm</td><td>50mm/mt</td><td>360kg</td></tr><tr><td>2.</td><td>RDSO/T-3516</td><td>45mm</td><td>50 mm/mt</td><td>420kg</td></tr><tr><td>3</td><td>RDSO/T-3702</td><td>60mm</td><td>5 mm/mt</td><td>480kg</td></tr><tr><td>4</td><td>RDSO/T-3706</td><td>60mm</td><td>5 mm/mt</td><td>390kg</td></tr><tr><td>5</td><td>RDSO/T-3707</td><td>60mm</td><td>5 mm/mt</td><td>720kg</td></tr><tr><td>6</td><td>RDSO/T-3708</td><td>60mm</td><td>5 mm/mt</td><td>960kg</td></tr><tr><td>7</td><td>RDSO/T-3723</td><td>45mm</td><td>5 mm/mt</td><td>600kg</td></tr><tr><td>8</td><td>RDSO/T-8751</td><td>60mm</td><td>5 mm/mt</td><td>490kg</td></tr><tr><td>9</td><td>RDSO/T-8752</td><td>60mm</td><td>5 mm/mt</td><td>760kg</td></tr><tr><td>10</td><td>RDSO/T-8753</td><td>60mm</td><td>5 mm/mt</td><td>1000kg</td></tr></table></td><td>Comments of M/s Black Burn & Co. Pvt. Ltd.:

CBL values of RT 6939/6939/8222 & 8223 liners are missing.

Comments of M/s Adinath Industries & M/s Parasnath Enterprises:

CBL values of Drawing No.RT 6939/6939/8222 & 8223 liners to be added in the lists.</td><td>Comments of the firm have been accepted. Accordingly CBL value of RT-6938, RT-6939, RT-8222 & RT-8223 has been added in the table.

same as above</td></tr>
</table>

<table>
<tr><th colspan="2">SN</th><th colspan="2">Para</th><th>Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)</th><th>Comments of Stake holders</th><th>RDSO's Remarks</th></tr>
<tr><td colspan="2">APPENDIX-V</td><td colspan="2"></td><td>
Name of the firm: M/s.
Liner to Drg No.:
…….Railway's P.O No.:
Quantity on order:

Test results of 1. Internal Cavity
1. Cross Breaking Load
2. % Water absorption
3. Viscosity no.
4. Flexural strength

<table>
<tr><th rowspan="2">Lot No</th><th rowspan="2">Qty. in Nos</th><th colspan="2">Internal cavity test</th><th colspan="2">Cross breaking load test of GFN Liner</th><th colspan="2">Water absorption test</th><th colspan="2">Viscosity no. test for HVN Liner</th><th colspan="2">Flexural Strength for HVN Liner</th></tr>
<tr><th>Sample No</th><th>Free from Internal cavity Yes / No</th><th>Sample No.</th><th>Cross Breaking Load (Kg)</th><th>Sample No.</th><th>% water absorption</th><th>Sample No.</th><th>Viscosity No.</th><th>Sample No.</th><th></th></tr>
<tr><td>1</td><td>10000</td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td>1</td><td></td><td>1</td><td></td></tr>
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<tr><td></td><td></td><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>10000</td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td>1</td><td></td><td>1</td><td></td></tr>
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</table>
</td><td>
Comments of M/s Industrial Components Industries & M/s Polymer Products Of India

Sl. No. of tests to be corrected

Comments of M/s Black Burn & Co. Pvt. Ltd.:

Column for Flexural Strength for HVN liners should be deleted as this test is not performed on HVN liners.

Comments of M/s Adinath Industries & M/s Parasnath Enterprises:

Column for Flexural Strength for HVN liners should be deleted as this test is not possible to perform on HVN liner.
</td><td>
Comments of the firm have been accepted and Table has been modified.

Para has been modified.

Para has been modified.
</td></tr>
</table>

SN	Para	Draft IRS Specification for Glass filled Nylon-66 & High Viscous Nylon-66 Insulating Liners, Sl. No. T-44-2023(Second Revision)	Comments of Stake holders	RDSO's Remarks
		<table><tr><td></td><td></td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td>3</td><td></td><td>3</td><td></td></tr><tr><td></td><td></td><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> & so on		