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Issue/Rev	Details of Changes	Date
Rev-01	1.0 Para 1.0 (Scope), para 2 (Applicability) & para 4 Description modified. 2.0 Para 4.5 (Weight) deleted.	06-3-2001

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glass pane from inside of the coach. The frame shall be provided with two drain slots in the bottom part. The rubber profile can be removed by pulling a red handle in the upper part of the window. The glass pane is also fitted on the inside with a small red handle to enable easy removal. The bottom part of the glass pane is locked to the frame with two 400 mm long wires to prevent it from folding down when it is removed during an emergency condition.

3. Hopper Window : Thickness of hopper glass = 6,38 mm (3mm clear/0,38 mm white film / 3 mm toughened clear). The aluminium frame shall be black anodised to ISO-7599 AA 20. The glass pane shall be fitted in the aluminium frame with a rubber profile. It should be possible to change the glass pane from inside of the coach. The hopper part shall be fitted with a handle which has an integrated locking device. The lock is operated by 8 mm square key. The hopper window has two fixed positions, closed and open inwards at an angle of approx. 30°. The frame shall be provided with two drain slots in the bottom part of the hopper glass and two at the bottom part of the fixed glass.

4. Fixed Small Window : The aluminium frame shall be black anodised to ISO-7599 AA 20. The glass pane shall be fitted in the aluminium frame with a rubber profile. It should be possible to change the glass pane from inside of the coach. The frame shall be provided with two drain slots in the bottom part.

5. Emergency openable window: The force for pulling out the emergency window shall not be more than 150 N (± 15%)

6. Window glass unit shall be as per the MDTS 089.

7. The exterior of the window glass unit shall align with exterior surface of the carbody.

8. It shall be possible to replace the window glass within 4 hours.

10. Aluminium profiles as per spec. EN-AW-6063, EN-AW-AlMg0,7Si (Europe) or AA6063 (US) Technical

Yield point $R_p0.2$	170 N/mm^2 min
Rupture limit R_π	215 N/mm^2 min
Elongation A_5	12% min
Hardness	12 Webster B or 70 Vickers
Modules of elasticity	70 000 N/mm^2
Shear modules	27,000 N/mm^2
Poisons number	0,33

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1. Scope:

This specification covers the general and technical requirements of window arrgt. for ALSTOM-LHB Design coaches.

2. Applicability :

These window arrgt. are to be fitted in ALSTOM-LHB design AC coaches. Following types of window arrangement are to be required :

1. Fixed Window
2. Emergency exit window
3. Fixed small Window
4. Hopper window

No. of windows required for various coaches shall be described by the purchaser at the time of placement of order.

3. Functional Requirements :

1. Window arrangement shall be of a modular unit and all windows shall be of same design.
2. The final finish & design of the window arrgt. assembly should be such as to give an aesthetic appearance to the interior & exterior of the coach. The finish & colour of the various components of the assembly must conform to the overall colour scheme of the passenger coach.
3. Mounting of window assembly shall be possible only from inside the windows.

4. Description & Technical requirements:

1. Fixed window : The aluminium frame shall be black anodised to ISO-7599 AA 20. The glass pane shall be is fitted in the aluminium frame with a rubber profile. It should be possible to change the glass pane from inside of the coach. The frame shall be provided with two drain slots in the bottom part.

2. Emergency Openable Window : The aluminium frame shall be black anodised to ISO-7599 AA 20. The glass pane shall be is fitted in the aluminium frame with a rubber profile. It should be possible to change the

11 The rubber profiles shall be as per MDTS030 and have the following characteristics:

Property	Unit	Demand
Hardness	Sh	70 ± 5
Tensile strength	Mpa	min 7
Elongation at break	%	min 200
Compression set 22h/100°C	%	max 50
Volume change oil nr 3 70 h/100° c	%	max +80
Oxygen index	%	min 30
Color		Black
Change after ageing 70 h/100° c		
Hardness	sh	max ± 15
Tensile strength	%	max ± 30
Elongation at break	%	max -50

5. Mechanical strength requirements

1. The mechanical strength of the window arrgt. has to meet the requirements para 4.2.2 of UIC 566.

2. The passenger coaches running on Indian Railways are designed for a service life of 30 years. The window arrgt. are to be developed and assembled accordingly.

3. Resistance to vermin :
   Selection of the materials (insulation, sealant, rubber, etc.), should be done with due consideration to their resistance to vermin (e.g. termites).

6 Warranty :

The supplier shall give warranty for the complete or part of window arrgt., for failing or proving unsatisfactory in service due to defective design, material or workmanship within 36 months from the date of regular supply and shall replace the same at his own cost and risk.

7 Documents to be submitted by supplier for prototype approval:

The following documentation for the assembly of the window arrgt. are to be prepared by the supplier for submission along with the prototype assembly.

1. A set of drawings consisting of drawings and parts lists
2. Clearly organised instructions for mounting and adjusting the window arrgt.,

changing the window arrgt. and wearing parts
3. Maintenance and repair instructions.
4. Technical description of the window arrgt.

8 Testing of prototype & regular production assemblies:

1.0 The supplier shall supply one prototype of the each window arrgt. alongwith the documents indicated above for approval before commencing bulk supply. These prototype and drawings shall be examined from all view points.

2.0 Testing of window shall be done as per para 4.2.2 of UIC-566 and UIC-564 and the supplier shall submit a test certificate of successful testing from a reputed firm / laboratory in this regard.

3.0 Type test shall include the following:

A. Fixed window large/small

Classification of glass to IS:2553 Pt-1
Marking of glass
Surface treatment of aluminium frame to ISO :7599 AA20
Measurement of dimension
Measurement of weight

B. Hopper type window

In addition to type test for fixed window functioning of locks and latches are to be checked.

C. Emergency openable window

In addition to type test for fixed windows , checking of the force for opening the openable window.

4.0 Supplier shall incorporate changes suggested by RCF in the prototype as well as bulk supply. The bulk manufacture shall be undertaken only after the approval of prototype.

5.0 This clause is applicable for first supply of a supplier. However, RCF shall have the right to repeat prototype approval process in subsequent order also. In this regard RCF decision shall be final.

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9.0 Upgradation of design

Supplier may offer alternate design of Windows for all the above or any of the above clauses with a view to upgrade the design. Clausewise justification shall be given by the supplier in such case. Windows having lower weight shall be preferred. Specification details may be deviated from those specified above, if sufficient technical justification is available. However, RCF's decision on all such matters shall be final.

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