ANNEXURE-A

FUNCTIONAL & DESIGN REQUIREMENTS FOR DEVELOPMENT OF SPECIFICATION FOR;

FRAMING OF SPECIFICATION FOR COACH INSULATING MATERIAL FOR IR AC & NON AC COACHES.

1. FUNCTIONAL REQUIREMENTS:

The system supplied should work satisfactorily under the following operating conditions of IR coaches:

1.1 Coach Dynamics:

Equipment shall withstand satisfactorily the vibrations and shocks normally encountered in service as indicated below:

i)	Maximum vertical acceleration	1.0g
ii)	Maximum longitudinal acceleration	3.0g
iii)	Maximum transverse acceleration	2.0g

The vibrations are of sine wave form and the frequency vibration is between 1 Hz to 50 Hz.

The amplitude 'a' expressed in millimeters is given as a function of f, by equations

$a = 25/f$ for values of f from 1 Hz to 10 Hz.

$a = 250/f^2$ for values of f exceeding 10Hz and up to 50 Hz.

1.2 In the direction corresponding to the longitudinal movement of the vehicle, the equipment is subjected for 2 min. to 50 Hz. Vibrations of such a value that the maximum acceleration is equal to 3g.

1.3 Coach-body displacement encountered under dynamic conditions.

i)	Vertically-	±100 mm
ii)	laterally -	±55 mm
iii)	longitudinally-	±10 mm
iv)	bogie rotation about center pivot-	$\pm 4^0$

1.4 Ambient Conditions

(i)	Ambient temperature	:	-4° C to 50° C
	Altitude	:	Sea level to 2500m
	Max. temperature under Sun	:	70° C
	Relative humidity	:	40% to 95%

(ii) The rainfall is fairly heavy.

(iii) During dry weather, the atmosphere is likely to be dusty.

(iv) Temperature variations can be quite high in the same journey or short period of time.

(v) Coaches operate in coastal areas with continued exposure to salt laden air.

(vi) The coach length over buffer is approximately 22.3 meters for ICF type coaches & for LHB type coach length over coupler is approximately 24 meters.

1.5 Coach Inside Conditions:

Inside condition of the coach may consider as under:

i) The ambient conditions may be similar as mentioned under para 1.4 above, as there is no control in temperature for non-AC coaches. However in summer day the value of upper range of the temperature may go up to 60^0C nearby the roof ceiling. There may be remarkable variation in temperature inside of the coach from floor to roof level.

ii) Wind flow speed nearby the window portion may be considered more than the specified speed of the non-AC coaches, as windows may remain opened. The specified speed of the non-AC coaches is 110 kmph and 130 kmph in AC coaches.

iii) Air conditioned Coaches are equipped with roof mounted air conditioning system with central ducting system and side distribution branch lines. The coaches are conditioned to a nominal temperature of 23°C to 25°C, RH 55% to 60% & air flow @ 4000 cubic meter /hour.

2.0 DESIGN REQUIREMENTS:

2.1 The Fire Extinguishers shall have a proven and established technology/system on National/ International Railway Systems. Documentary evidence of such as proof of supply and satisfactory performance certificate and of satisfactory service from user Railway(s) shall be provided by the vendor.

2.2 Coach insulating material shall have a proven and established technology/system on National/ International Railway Systems. Documentary evidence of such as proof of supply and satisfactory performance certificate and of satisfactory service from user Railway(s) shall be provided by the vendor.