

INDIAN RAILWAYS



CHECK SHEETS

FOR

CRF SECTIONS OF BOGIE COVERED FLY ASH / CEMENT WAGON TYPE--“BCFCM”

S.No.	Month & Year of issue	Revision / Amendment	Page No.	Reason for Amendment
1.	JULY - 2019	First issue	-	--
2.	March.-2020	Revision	-	Mech./Transportation code “BCFCM” Incorporated in drawings

ISSUED BY

RESEARCH DESIGNS AND STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
LUCKNOW-226 011

CONTENTS

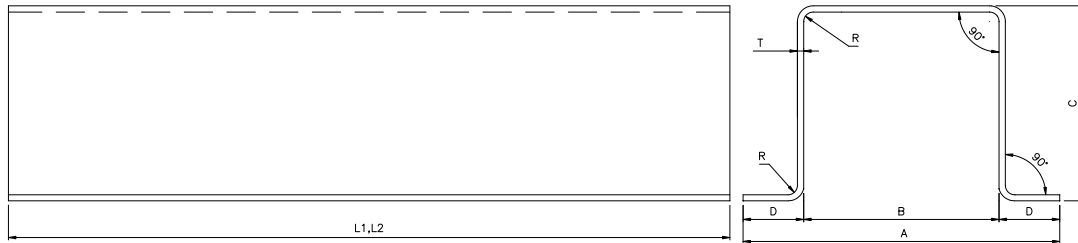
Sr. No.	Description	Page No
1.	Centre Sill-CRF	3
2.	Solebar-CRF	4
3.	Top Coping Angle	5
4.	Corner Stanchion	6
5.	Roof Carline Long	7
6.	End Stiffening Inner	8
7.	End Stiffening outer	9
8.	Longitudinal Stiffener Pressing (Inner)	10
9.	Longitudinal Stiffener Pressing (Centre)	11
10.	Longitudinal Straight Pressing	12

Note:

1. These check sheets do not detail all the dimensions or technical requirements of respective wagon assemblies/components. These check sheets are issued only for General Guidance & assistance of inspecting officials. Notwithstanding the above, the inspecting officials are advised to refer to relevant drawings and/or relevant specifications to confirm conformity to the specified dimensions and technical details.
2. (a) In check sheets wherever it is indicated that two dimensions are to be measured, it means measurement of that dimension at two end locations of the component.

(b) In check sheets wherever it is indicated that three dimensions are to be measured, it means measurement of that dimension at two end locations of the component, and one at the center of the component.

CENTRE SILL-CRF



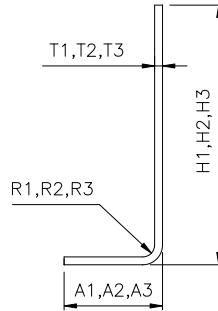
Ref: Drawing No. WD-15014-S-05 Item-2a & WD-19041-S-1 Item-1

CENTRE SILL-CRF				Date:	
SL. NO.	Stage	Works Inspection	Inspecting Authority	Remarks	
1	Dimension	As follows			
	Location	Nominal Dimensions & Allowable Deviation		Actual Dimension	
				Works Inspection	RDSO Inspection
i.	Bottom width	A	530, ± 3		
ii.	Top width(Inside)	B	327,+3,-0		
iii.	Length Overall	L1/L2	1900 ±1		
iv.	Height Overall	C	327 ±1.5		
v.	Flanges	D	101.5		
vi.	Thickness	T	10,+0.5,-0.0		
vii.	Radius	R	20±1.5		
viii.	Angle	-	±1°		
ix.	Waviness	-	2 max.		
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm.		
xi.	Camber	-	1 in 600		
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.		
xiii.	Appearance	-	Free From Deep Marks, Cracks & Other Defects.		

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

SOLEBAR-CRF



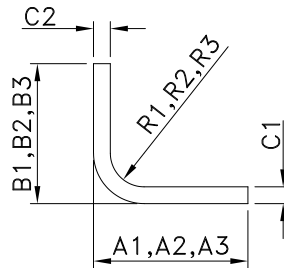
Ref: Drawing No. WD-15014-S-05 Item-1a & WD-19041-S-1 Item-2

SOLEBAR-CRF			Date:			
SL. NO.	Stage	Works Inspection	Inspecting Authority		Remarks	
1.	Dimensions	As follows				
	Location		Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
				Works Inspection	Inspecting Authority	
i.	Flange(Bottom)	A1	100 ±1.25			
		A2				
		A3				
ii.	Height	H1	265 ± 1.25			
		H2				
		H3				
iii.	Thickness	T1	8 ± 0.40			
		T2				
		T3				
iv.	Length	L1	10091,+4,-2			
		L2				
vii.	Radius	R1	16 ± 1.50			
		R2				
		R3				
viii.	Angle	-	± 1°			
ix.	Waviness	-	2 max.			
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm			
xi.	Camber	-	1 in 600			
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.			
xiii.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects.			

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

TOP COPING ANGLE



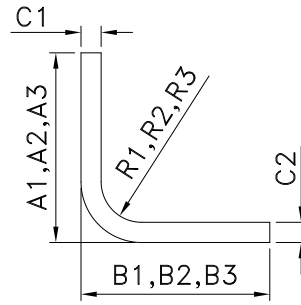
Ref: Drawing No. WD-15014-S-08 Item-1& WD-19041-S-1 Item-3

TOP COPING ANGLE			Date:			
SL. NO.	Stage	Works Inspection	Inspecting Authority		Remarks	
1.	Dimensions	As follows				
	Location		Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
				Works Inspection	Inspecting Authority	
i.	Flange(Bottom)	A1 A2 A3	55 ± 1.25			
ii.	Flange(Top)	B1 B2 B3	50 ± 1.25			
iii.	Thickness	C1 C2	6 ± 0.3			
iv.	Length	Top Bottom	10241, +4, - 2			
v.	Radius	R1 R2 R3	12 ± 1.50			
vi.	Angle	-	± 1°			
vii.	Waviness	-	2 max.			
viii.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm			
ix.	Camber	-	1 in 600			
x.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.			
xi.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects			

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

CORNER STANCHION



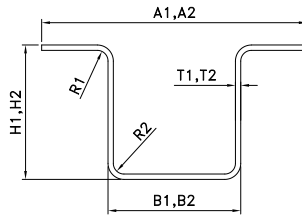
Ref: Drawing No. WD-15014-S-09 Item-3 & WD-19041-S-1 Item-4

Corner Stanchion				Date:	
SL. NO.	Stage	Works Inspection	Inspecting Authority	Remarks	
1.	Dimensions	As follows			
	Location	Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
			Works Inspection	Inspecting Authority	
i.	Flange(top)	A1	75 ± 1.25		
		A2			
		A3			
ii.	Flange(bottom)	B1	75 ± 1.25		
		B2			
		B3			
iii.	Thickness	C1	8 ± 0.40		
		C2			
iv.	Length	Top	2500, +3, -1		
		Bottom			
v.	Radius	R1	16 ± 1.5		
		R2			
		R3			
vi.	Angle	-	± 1°		
vii.	Waviness	-	2 max.		
viii.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm		
ix.	Camber	-	1 in 600		
x.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.		
xi.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects		

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

ROOF CARLINE LONG



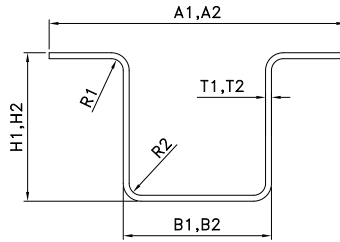
Ref: Drawing No. WD-15014-S-10 Item-3 & WD-19041-S-1 Item-5

ROOF CARLINE LONG			Date:			
SL. NO.	Stage	Works Inspection		Inspecting Authority		Remarks
1.	Dimensions	As follows				
	Location		Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
				Works Inspection	Inspecting Authority	
i.	Top Width	A1	100 ± 1.5			
		A2				
ii.	Bottom Width	B1	50 ± 1.5			
		B2				
iii.	Thickness	T1	3.15 ± 0.20			
		T2				
iv.	Radius	R1	5 ± 1.50			
		R2				
v.	Height	H1	50 ± 1.25			
		H2				
vi.	Length	Top	3300 ,+3,-1			
		Bottom				
viii.	Angle	-	±1°			
ix.	Waviness	-	2 max			
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm			
xi.	Camber	-	1 in 600			
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.			
xiii.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects			

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

END STIFFENING OUTER



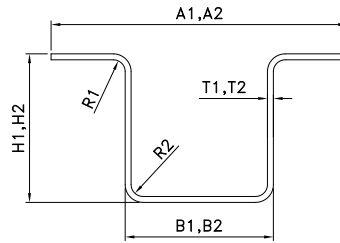
Ref: Drawing No. WD-15014-S-10 Item-5 & WD-19041-S-1 Item-6

END STIFFENING OUTER			Date:			
SL. NO.	Stage	Works Inspection		Inspecting Authority		Remarks
1.	Dimensions	As follows				
	Location		Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
				Works Inspection	Inspecting Authority	
i.	Top Width	A1	100 ± 1.5			
		A2				
ii.	Bottom Width	B1	50 ± 1.5			
		B2				
iii.	Thickness	T1	3.15 ± 0.20			
		T2				
iv.	Radius	R1	5 ± 1.50			
		R2				
v.	Height	H1	50 ± 1.25			
		H2				
vi.	Length	Top	266 ± 1			
		Bottom				
viii.	Angle	-	±1°			
ix.	Waviness	-	2 max			
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm			
xi.	Camber	-	1 in 600			
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.			
xiii.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects.			

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

END STIFFENING INNER



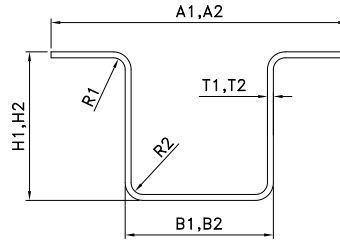
Ref: Drawing No. WD-15014-S-10 Item-6 & WD-19041-S-1 Item-7

END STIFFENING INNER			Date:		
SL. NO.	Stage	Works Inspection	Inspecting Authority	Remarks	
1.	Dimensions	As follows			
	Location	Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
			Works Inspection	Inspecting Authority	
i.	Top Width	A1	100 ± 1.5		
		A2			
ii.	Bottom Width	B1	50 ± 1.5		
		B2			
iii.	Thickness	T1	3.15 ± 0.20		
		T2			
iv.	Radius	R1	5 ± 1.50		
		R2			
v.	Height	H1	50 ± 1.25		
		H2			
vi.	Length	Top	410 ± 1		
		Bottom			
viii.	Angle	-	±1°		
ix.	Waviness	-	2 max		
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm		
xi.	Camber	-	1 in 600		
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.		
xiii.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects		

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

LONGITUDINAL STIFFENER PRESSING (INNER)



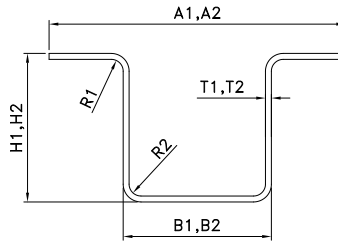
Ref: Drawing No. WD-15014-S-10 Item-11A & WD-19041-S-1 Item-8

LONGITUDINAL STIFFENER PRESSING (INNER)				Date:		
SL. NO.	STAGE	Works Inspection		Inspecting Authority		Remarks
1.	Dimensions	As follows				
	Location		Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
				Works Inspection	Inspecting Authority	
i.	Top Width	A1	100 ± 1.5			
		A2				
ii.	Bottom Width	B1	50 ± 1.5			
		B2				
iii.	Thickness	T1	3.15 ± 0.20			
		T2				
iv.	Radius	R1	5 ± 1.50			
		R2				
v.	Height	H1	50 ± 1.25			
		H2				
vi.	Length	Top	915 ± 1			
		Bottom				
viii.	Angle	-	±1°			
ix.	Waviness	-	2 max			
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm			
xi.	Camber	-	1 in 600			
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.			
xiii.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects			

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

LONGITUDINAL STIFFENER PRESSING (CENTRE)



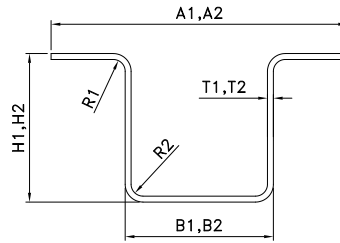
Ref: Drawing No. WD-15014-S-10 Item-11B & WD-19041-S-1 Item-9

LONGITUDINAL STIFFENER PRESSING (CENTRE)				Date:		
SL. NO.	STAGE	Works Inspection		Inspecting Authority		Remarks
1.	Dimensions	As follows				
	Location		Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
				Works Inspection	Inspecting Authority	
i.	Top Width	A1	100 ± 1.5			
		A2				
ii.	Bottom Width	B1	50 ± 1.5			
		B2				
iii.	Thickness	T1	3.15 ± 0.20			
		T2				
iv.	Radius	R1	5 ± 1.50			
		R2				
v.	Height	H1	50 ± 1.25			
		H2				
vi.	Length	Top	1075 ± 1			
		Bottom				
viii.	Angle	-	±1°			
ix.	Waviness	-	2 max			
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm			
xi.	Camber	-	1 in 600			
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.			
xiii.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects			

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

LONGITUDINAL STRAIGHT PRESSING



Ref: Drawing No. WD-15014-S-10 Item-12 & WD-19041-S-1 Item-10

LONGITUDINAL STRAIGHT PRESSING			Date:			
SL. NO.	STAGE	Works Inspection		Inspecting Authority		Remarks
1.	Dimensions	As follows				
	Location		Nominal Dimensions & Allowable Deviation	Actual Dimension		Remarks
				Works Inspection	Inspecting Authority	
i.	Top Width	A1	100 ± 1.5			
		A2				
ii.	Bottom Width	B1	50 ± 1.5			
		B2				
iii.	Thickness	T1	3.15 ± 0.20			
		T2				
iv.	Radius	R1	5 ± 1.50			
		R2				
v.	Height	H1	50 ± 1.25			
		H2				
vi.	Length	Top	1063.5 ± 1			
		Bottom				
viii.	Angle	-	±1°			
ix.	Waviness	-	2 max			
x.	Bow	-	1 in 600. Maximum Bow in horizontal plane should be 5 mm			
xi.	Camber	-	1 in 600			
xii.	Twist	-	1deg/metre. Maximum twist over entire length of section should be within 35 mm.			
xiii.	Appearance	-	Free From Deep Marks ,Cracks & Other Defects			

All dimensions are in mm

Works Inspector		Inspecting Authority	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	

Sampling plan											
S. No	Component s/ Operation /Product/ Process		Characteristics/ Parameters	Mode of Inspection/ Equipments	Internal Inspection Sample-		Reference documents/ Specification	Acceptance Criteria	Documents of Records	RDSO Inspection Sample-	
					Size	Frequency				Size	Frequency
1	Raw Material Receipt	a)	Source of Procurement	Visual	-	Every lot	Receipt Particulars & RDSO's Vendor List	Should be procured from RDSO approved sources only	Format no....	-	Every Lot
		b)	System of Unloading	Visual	Complete Lot	Every lot	Nil	No external damage should occur		AUDIT	
		c)	Quantity	Visual	Complete Lot	Every lot	Receipt particulars	To be as per receipt particulars			
		d)	Weight	Weighing Machine	One/Lot	Every lot					
2	Raw Material Inspection	a)	Identification of Coil/plate	Visual	Every coil/plate	Every coil/ plate	T.C.	Coil No. & Heat No. to be as per T.C.	Format no---	AUDIT	
		b)	Coil/Strip width & thickness	Measuring Tape/Steel Rule/ Micrometer	One per Coil/Plate	3 times (start, middle, end) of coil/plate	Indent & T.C.	To be as per indent/design requirement		Complete Lot	Every lot
		c)	Grade	By means of suitable m/c / test equipment in house lab/NABL approved lab	Complete Lot	Every lot	Indent & T.C.	To be as per indent/design requirement			
		d)	Mechanical Properties		Complete Lot	Every lot	Indent & T.C.	To be as per prescribed specification			
		e)	Chemical Properties		Complete Lot	Every lot	Indent & T.C.	To be as per prescribed specification			
		f)	Bend Test		Complete Lot	Every lot	Indent & T.C.	To be as per prescribed specification			
		g)	Testing of Mechanical & Chemical Properties and Bend Testing		One/Lot	Every lot	Prescribed specification	To be as per prescribed specification		Format no....	2 (1 to be tested & 1 to be stored)
a)	Condition of storage area	visual	Complete lot		Daily	-	Covered area and protection from water	Format no---	AUDIT		
b)	Availability of Racks/Packing			Proper racks and packing to be available							
c)	Condition of Material			To be free from damages, dents & rust.							
4	Selection of coil for slitting	a)	Condition of Coil	Visual	Complete coil/plate	Every coil/ plate	-	Coil/plate to be free from damage & rust	Format no---	AUDIT	

S. No	Component s/ Operation /Product/ Process		Charcteristics/ Parameters	Mode of inspection/ equipments	Internal inspection sample		Ref documents/ specifications	Acceptance criteria	Documents of records	RDSO inspection Sample	
					Size	Frequency				Size	Frequ ency
5	Handling of coil/plates/S ections till despatch	a)	Care during movement	Visual	Every coil/ plate/Secti on	Every coil/ plate/section	-	No damage/dent to occur	Format no---	AUDIT	
6	Coil/plate slitting	a)	Coil/Plate width	Measuring Tape/ Steel Rule/Vernier	One per Coil/Plate	3 times (start, middle, end) of coil/plate	Design requirement	To be as per design requirement	Format no---	AUDIT	
		b)	Edge condition	Visual	Complete slitted Coil/Plate	Every slitted Coil/ Plate	Should be smooth	To be free from burrs, sharp edges			
7	Setting of rolls on mill	a)	Correctness of rolls	Visual/Measuri ng Tape/ Steel Rule/Vernier	Every rolling mill	Twice in one shift		All rolls to be as per design requirement	Format no---	AUDIT	
8	In-process Inspection	a)	Profile of the section	Measuring tape, Vernier, Bevel protactor, Radius gauge	1 no.	3 times (start,middle, end) of coil/plate	Respective RDSO/P.O. drawing/check sheet	To be as per respective RDSO/P.O. drawing/chec k sheet	Format no---	AUDIT	
		b)	Marking of Coil/plate no.	Visual	1 no.	Every coil/plate	-	To be same as the selected coil	Format no---	AUDIT	
9	Post Roll Forming Operations	a)	Drilling	Vernier/Gauge	1 no.	Every section	Respective RDSO/P.O. drawing/check sheet	To be as per respective RDSO/P.O. drawing/chec k sheet	Format no---	AUDIT	
		b)	Notching	Visual							
		c)	Edge Preparation	Visual							
		d)	Profile cutting	Visual							
10	Welding	a)	Weld Preparation, Fixtures, Welding machine and current/voltage, welding electrodes, weld cleaning and condition of weld	Visual, Radiography (if, prescribed)	10%	Every lot	WPS, issued by RDSO	To be as per WPS, issued by RDSO	Format no---	5% (Mini mum two set)	Each lot
		11	Final Inspection	a)	Profile of the section	Measuring tape, Vernier, Bevel protactor, Radius gauge	10%	Every lot	Respective RDSO/P.O. drawing/check sheet	To be as per respective RDSO/P.O. drawing/chec k sheet	Format no---
b)	Edge condition			Visual	10%	Every lot	Respective RDSO/P.O. drawing/check sheet	To be as per respective RDSO/P.O. drawing/chec k sheet and free from burrs & sharp edges	Format no---	5% (Mini mum two set)	Each lot
c)	Drilling			Plug Gauge/ Vernier	1 no.	Every section	Respective RDSO/P.O. drawing/check sheet	To be as per respective RDSO/P.O. drawing/chec k sheet	Format no---	AUDIT	
d)	Notching			Visual							
e)	Edge Preparation			Visual							
f)	Profile cutting			Visual							

S. No	Component s/Operation/ Product/ Process		Characteristics/ parameters	Mode of inspection/ Equipments	Internal inspection sample		Reference documents/ specification	Acceptance criteria	Documents of records	RDSO inspection sample	
					Size	Frequency				Size	Frequency
12	Marking	a)	Correctness of marking	Visual	10%	Every lot	-	Month and year to be current and Coil No. to be same as Original No.	Format no---	5% (Minimum two set)	Each lot
		b)	Legibility of Marking	Visual	10%	Every lot	-	To be legible	Format no---	5% (Minimum two set)	Each lot
13	Linking of punched Coil No. with Grade of Material	a)	Material Properties	Visual	10%	Every lot	T.C. and lab Results	To be as per respective RDSO specification	Format no---	5% (Minimum two set)	Each lot
14	Packing of sections	a)	Condition of Packing	Visual	10%	Every lot	-	Packing to be sturdy and Marking on Packing should contain complete identification details of the Products	Format no---	Minimum Two packs	Each lot
		b)	Marking on Packing								
		c)	Condition of Packed Products								