

No.2005/M(N)/204/1(E.o.3322721)

Dated: 20.12.2022

The Principal Chief Mechanical Engineers
All Indian Railways

Sub: Loading pattern in BCN variants.

Ref: (i) RDSO's letter no. MW/BCNHL/MOD dated 29.04.2013 (Copy enclosed).

(ii) RDSO's letter no. MW/BCNAHSM1 dated 17.08.2022 (Copy enclosed).

RDSO vide letters u/r above, has issued loading pattern in BCNHL and other BCN variant wagons.

W.r.t. above, it is requested to conduct a one-month drive to check whether the loadings in the BCN variants are being done as per RDSO approved loading diagrams. The report of the drive may be submitted to this office latest by 30.01.2023 in the format below:

Drive Period		No. of Rakes checked	No. of wagons checked (Typewise)	No. of wagons loaded as per RDSO approved drawing	No. of wagons not loaded as per RDSO approved drawing	Action taken in case non standard cases are found
From	To					

Vivek
20/12/22
(Vivek Mohan)
Dir. Mech. Engg. (Freight)
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Copy to: EDS(Wagon), RDSO



सत्यमेव जयते

भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226011
Government of India - Ministry of Railways
Research Designs & Standards Organization
Lucknow - 226011

No. MW/BCNHL/MOD

April 29, 2013

DME(Freight)
Railway Board,
New Delhi

Loading Pattern in BCNHL Wagons.

- (i) SCR letter No. C.268/P/Goods/Loadability/10 dated 24/09/2012 addressed to Advisor (Rates) Rly Bd.
- (ii) RDSO letter No. MW/BCNHL dated 10/09/2010.
- (iii) DME(Frt) Rly Bd letter No. 2005/M(N)/204/1 Vol II dated 14/02/2013. — 220

Subject issue, concerning loading in BCNHL wagons has been studied.
Kindly note the following concerning the same:

The bagged commodities loaded in BCNHL wagons- Cement, Fertilizer & Food-grains are loose commodities & the sizes of the packed bags are not absolutely uniform/standardized. (This is also evident from annexure of the letter under ref (i), above). Further, the inherent flexibility of the packed bags, justifies some variations in bag sizes, when these commodities are loaded in bulk, in bagged form.
The loading of the above commodities is largely manual, using unskilled labour.
Owing to the above, any loading diagram detailing bulk loading can at-best be illustrative & should not be construed as singularly binding & the only recommended way for ensuring loading. The loading diagram should incorporate certain basics such as ensuring adequate space near doors, for safe transit/ unloading & safety of loading/ unloading personnel.

The loading diagram circulated by RDSO (Ref (ii), above) were based on extrapolated calculations, following actual loading (of cement, fertilizer & food-grains) done in presence of traffic, commercial & RDSO personnel in BCNA wagons.
BCNHL wagon design is a major design shift in covered wagon design. The BCNHL profile aims to utilize the loadable height & optimizes on the wagon length for maximizing total rake through-put. With the above principle, a BCNHL rake results in a rake throughput of 4106.4 T compared to 2934.8 T of a BCNA rake. This, thus, means a throughput improvement of over 40% on each rake of BCNHL. This new design concept, of utilizing the loadable height, would naturally need matching loading infrastructure, to fully exploit the loading promise. This aspect, is however, largely ignored in the case of BCNHL wagons. BCNHL wagons, which necessarily need

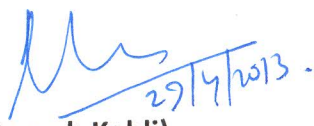
to be loaded to greater height, are being loaded using the older existing infrastructure & hence the issues in loadability.

6. The issue of loadability has once again been looked-at, in light of the communicated bag sizes. Enclosed to this letter are conceptual loading diagrams, that ensure the following loading in BCNHL wagons:

S.No.	Commodity	Assumed Bag Size (mm)	No. Of Bags	No. Of Vertical Stacks	Clear Space after loading (mm)	Loading Achieved (T)	Specified PCC (T)
1	Cement	720(L) x 418(W) x 140(H)	1416	13+ part 14	1020	70.8	70.8
2	Fertilizer (UREA)	720(L) x 480(W) x 140(H)	1160	13+ part 14	1020	58	58
3	Fertilizer (DAP & NPKF)	770(L) x 520(W) x 120(H)	1400	17+ part 18	820	70	70
4	Food Grains (Rice)	790(L) x 490(W) x 160(H)	1240	14+ part 15	417	62	62

It is requested that the enclosed diagrams be kindly perused & comments, if any, be kindly forwarded.

In case, practical loading trial(s) are to be done, in consultation with a ZR and/or customer & if, RDSO is needed to be associated in the exercise, the same, be kindly co-ordinated & intimated to RDSO.


(Rupesh Kohli)
Director/Wagon
For Director General/Wagon

LOADING DIAGRAM FOR LOADING OF CEMENT IN BCNHL WAGON

PAGE-1 OF 4

CALCULATION:-

PART:-A

$$\text{NO. of bags} = (8 \times 2) = 16$$

PART:-B

$$\text{NO. of bags} = (8 \times 4) = 32$$

PART:-C

$$\text{NO. of bags} = 5 \times 4 = 20$$

Total No. of Bag in one layer

$$= 2 \times \text{Part-A} + \text{Part-B} + 2 \times \text{Part-C}$$

$$= (2 \times 16) + 32 + (2 \times 20)$$

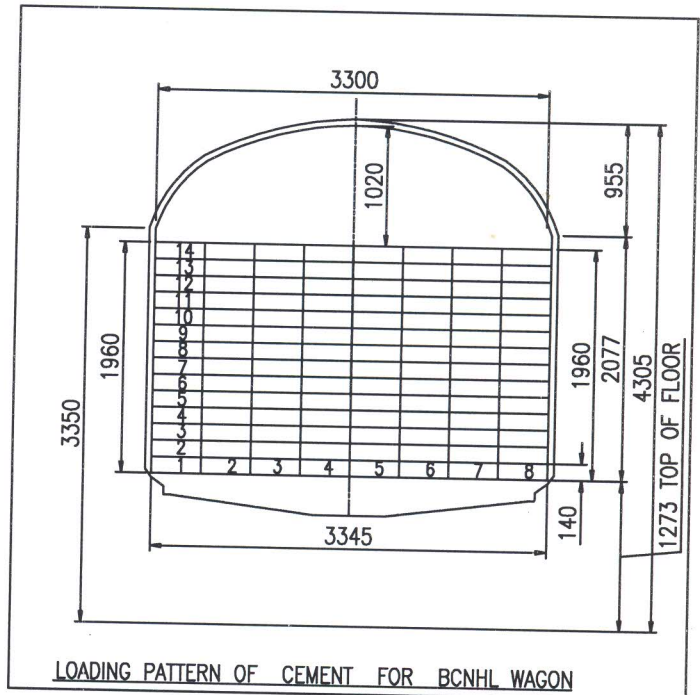
$$= 104 \text{ Bag}$$

Total No. of Bag in 14 layer

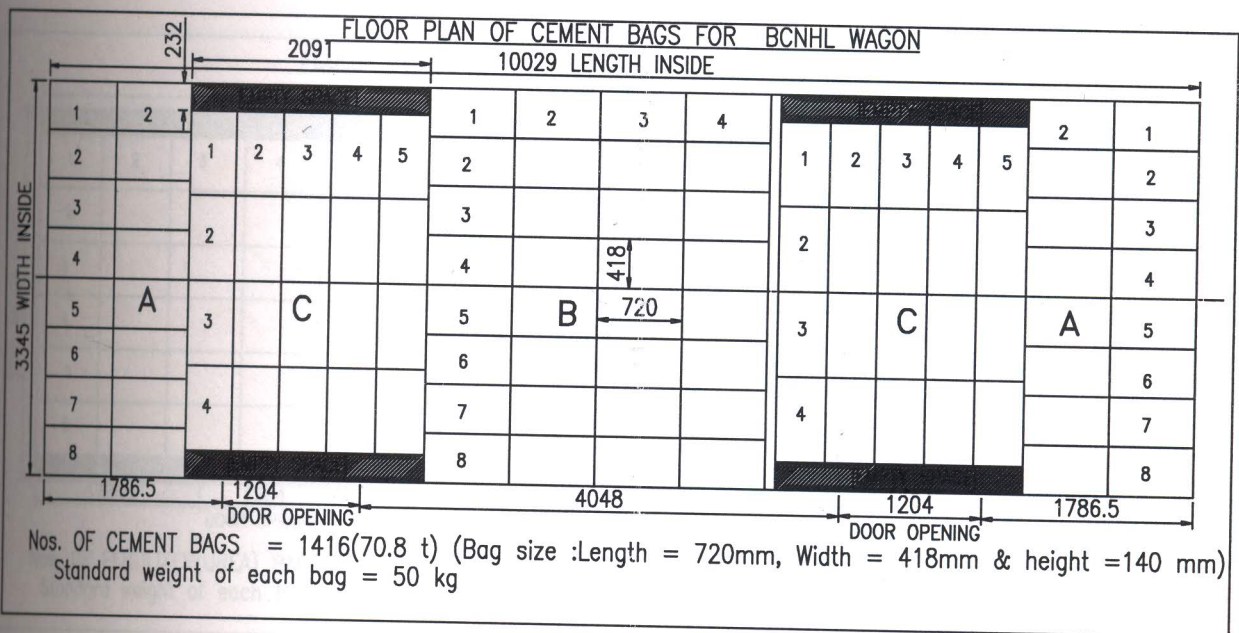
$$= 104 \times 13 \text{ LAYER} + 64 \text{ BAGS IN 14th LAYER}$$

$$= (1352 + 64) \text{ BAG}$$

$$= 1416 \text{ BAG}$$



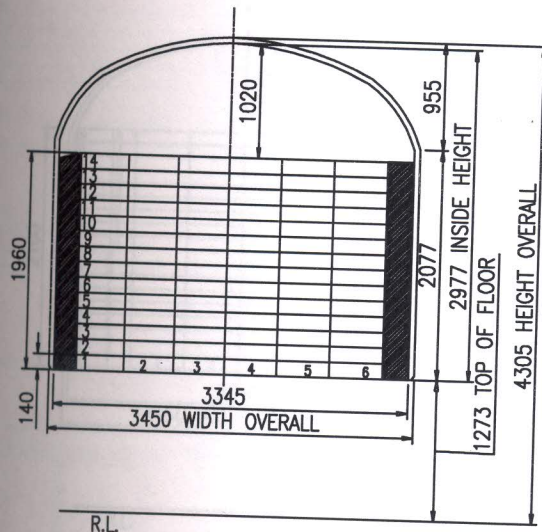
LOADING PATTERN OF CEMENT FOR BCNHL WAGON



Nos. OF CEMENT BAGS = 1416 (70.8 t) (Bag size :Length = 720mm, Width = 418mm & height =140 mm)
Standard weight of each bag = 50 kg

LOADING DIAGRAM FOR LOADING OF FERTILIZER(UREA) IN BCNHL WAGON

PAGE-2 OF 4



LOADING PATTERN OF FERTILIZER FOR BCNHL WAGON

CALCULATION:-

PART:-A TO F

NO. of bags in Widthwise=14

NO. of Row=6

Total No. of Bag in one layer

$$= \text{Part(A)} + \text{Part(B)} + \text{Part(C)} + \text{Part(D)} + \text{Part(E)} + \text{Part(F)}$$

$$= (14 \times 6)$$

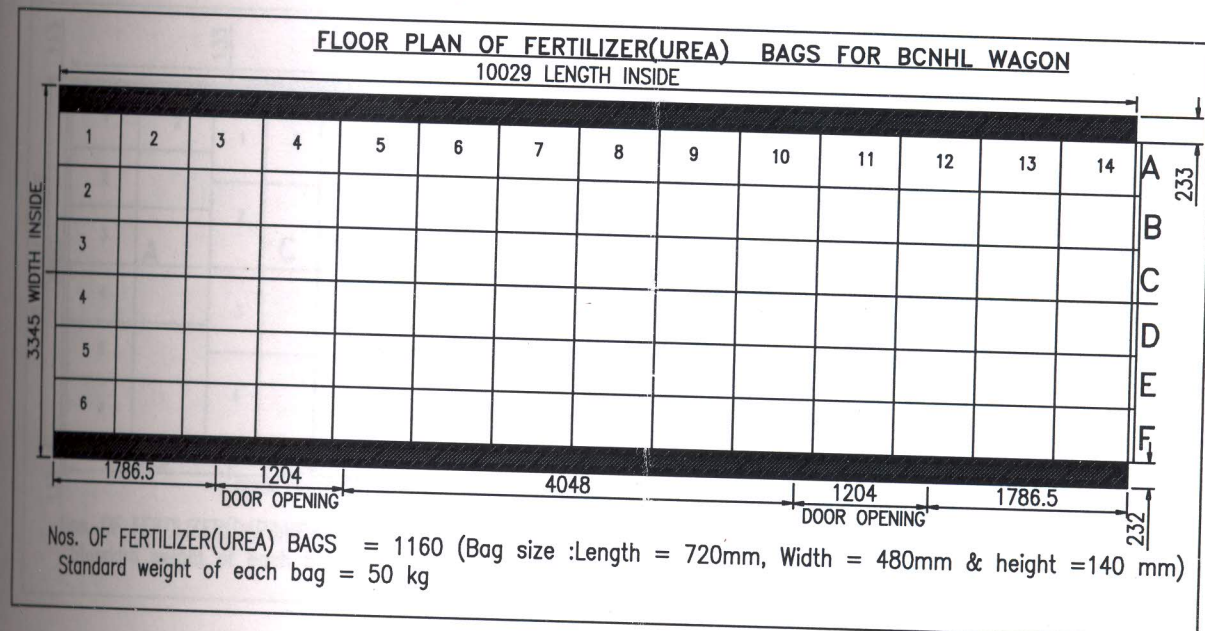
$$= 84 \text{ Bag}$$

FOR FERTILIZER(UREA):-

Total No. of Bag

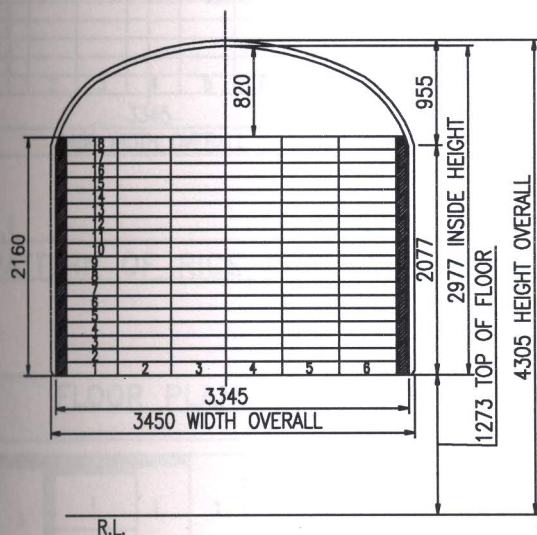
$$= 84 \times 13 \text{ LAYER} + 68 \text{ BAGS ON 14TH LAYER}$$

$$= (1092 + 68) = 1160 \text{ BAG (58 T)}$$



LOADING DIAGRAM FOR LOADING OF FERTILIZER(DAP&NPKF) IN BCNHL WAGON

PAGE-3 OF 4



LOADING PATTERN OF FERTILIZER FOR BCNHL WAGON

CALCULATION:-

PART:-A

NO. of bags = $(6 \times 2) = 12$ Bag

PART:-B

NO. of bags = $(6 \times 5) = 30$ BAG

PART:-C

NO. of bags = $(4 \times 3) = 12$ Bag

Total No. of Bag in one layer

$$= 2 \times \text{Part(A)} + \text{Part(B)} + 2 \times \text{Part(C)}$$

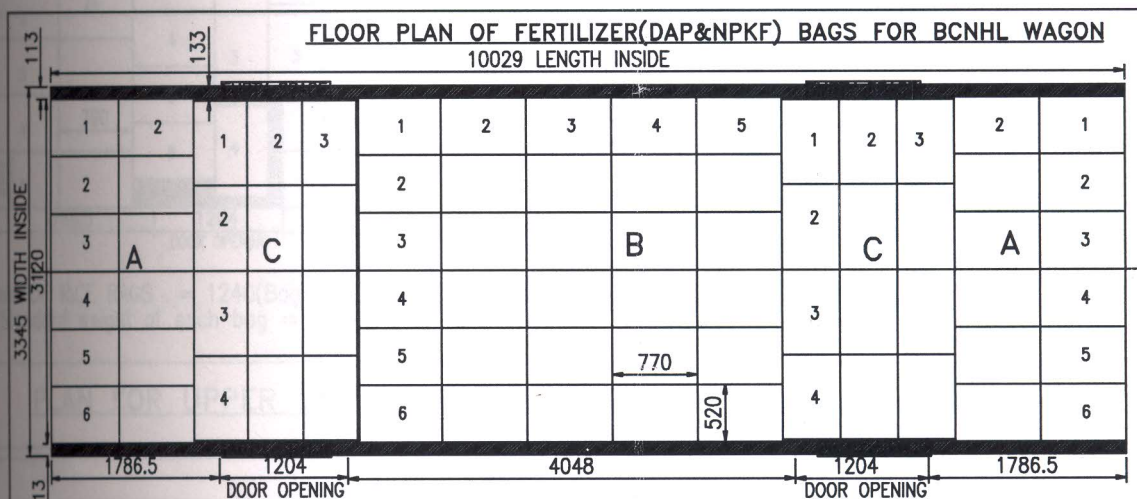
$$= (2 \times 12) + 30 + (2 \times 12) = 78 \text{ BAGS}$$

FOR FERTILIZER(DAP&NPKF):-

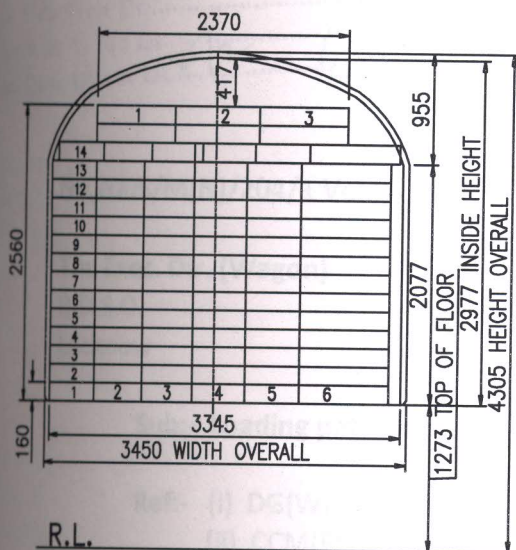
Total No. of Bag

$$= 78 \times 17 \text{ LAYER} + 74 \text{ BAG ON 18TH LAYER}$$

$$= (1326 + 74) = 1400 \text{ BAG}$$



Nos. OF FERTILIZER(DAP&NPKF) BAGS = 1400 (Bag size : Length = 770mm, Width = 520mm & height = 120 mm)
Standard weight of each bag = 50 kg



CALCULATION:-

PART:-A

NO. of bags = $(5 \times 2) + 3 + 6 + 4 = 23$ BAG

PART:-B

NO. of bags = $(8 \times 3) + 10 = 34$ BAG

PART:-C

NO. of bags = $(5 \times 2) + 3 + (4 \times 2) + 3$
 = $10 + 3 + 8 + 3$
 = 24 BAG

Total No. of Bag in one layer

= Part(A) + Part(B) + Part(C)

= $23 + 34 + 24 = 81$ BAG

FOR RICE:-

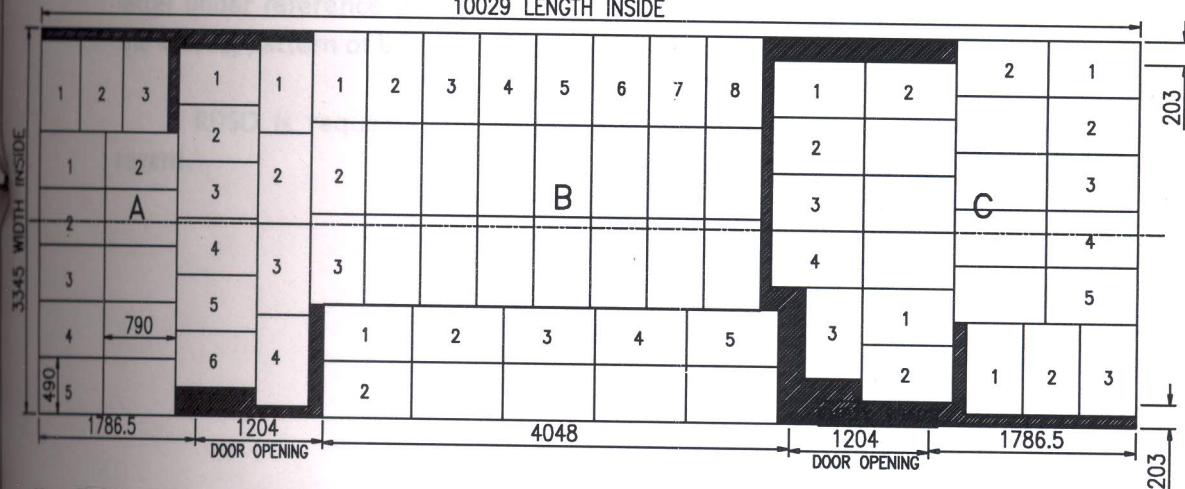
Total No. of Bag

= 81×14 LAYER + $(60 + 46)$ BAGS ON 15th & 16th LAYER
 = $(1134 + 106) = 1240$ BAG (62.0T)

R.L.
 LOADING PATTERN OF RICE FOR BCNHL WAGON

FLOOR PLAN OF RICE BAGS FOR BCNHL WAGON

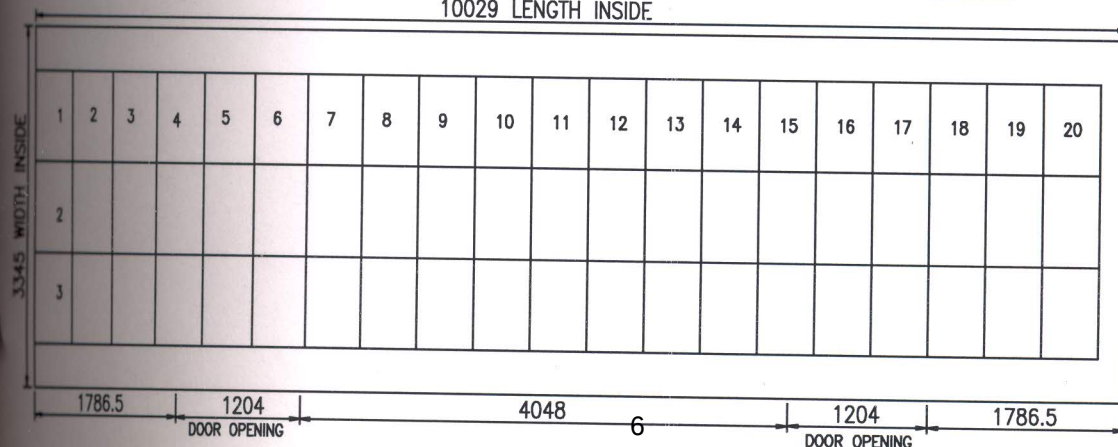
10029 LENGTH INSIDE



Nos. OF RICE BAGS = 1240 (Bag size : Length = 790mm, Width = 490mm & height = 160 mm)
 Standard weight of each bag = 50 kg

PLAN FOR UPPER LAYER OF RICE BAGS FOR BCNHL WAGON

10029 LENGTH INSIDE





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Government of India - Ministry of Railways
Research Designs & Standards Organisation
Lucknow – 226011
DID (0522)2450115
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No. MW/BCNAHSM1

Dated: 17.08.2022

All GM (Mechanical & Commercial)

Sub: Loading Pattern of BCN and BCNA Wagon

Ref: (i) CRSE/Freight/NCR letter no. NCR/MECH/830 Dated: 25.04.2022
(ii) This office letter no. MW/BCNHL dated: 04.05.2022

Vide reference-(i), CRSE/Freight/NCR has requested that loading diagram of BCN, BCNHL and other variants wagon may be circulated to all Zonal Railway for awareness of commercial staff.

Vide reference-(ii) above, a loading diagram of BCNHL wagon for loading of commodities was circulated to all Zonal Railway.

A copy of loading diagram of BCN and BCNA wagons is enclosed herewith for your kind information. This loading diagram is applicable for all variants of BCN and BCNA wagons.

DA : As above.

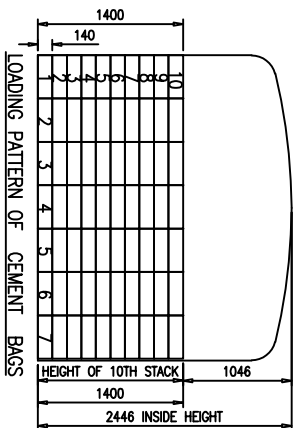
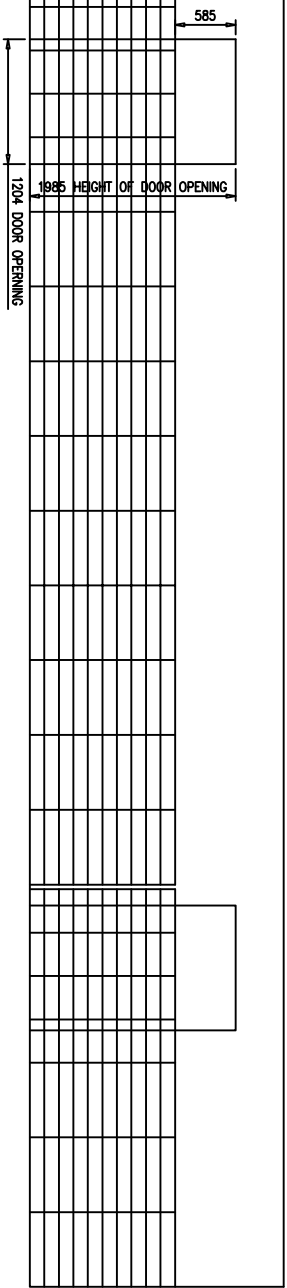
Digitally Signed by Arvind
Kumar

Date: 18-08-2022 15:09:55

Reason: Approved
(Arvind Kumar)
Jt. Director/ Wagon
for Director General

Copy to:- EDME (Freight)/ Railway Board, Rail Bhavan, New Delhi-110 001

LOADING DIAGRAM FOR LOADING OF CEMENT IN BCNM1/BCNHSM1 WAGON



CALCULATION:-

PART:-A
NO. of bags in Lengthwise= 3
NO. of bags in Widthwise= 7

PART:-B
NO. of bags in Lengthwise= 10
NO. of bags in Widthwise= 7

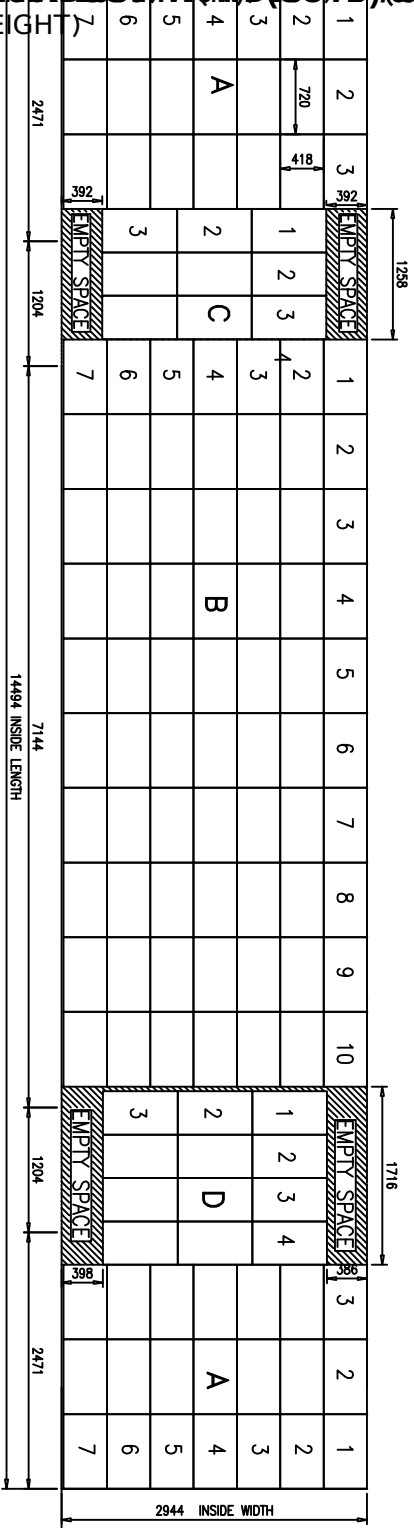
PART:-C
NO. of bags in Lengthwise= 3
NO. of bags in Widthwise= 3

PART:-D
NO. of bags in Lengthwise= 4
NO. of bags in Widthwise= 3

Total No. of Bag in one layer= 2XPart-A+Part-B+Part-C+Part-D
= 2X(7X3)+(10X7)+(3X3)+(4X3)
= (2X21)+70+9+12=133 Bog
Total No. of Bag in 10 layer=133X9 LAYER+84BAGS IN 10th LAYER
= (1197+84)
= 1281 BAG (64.05 T)

FLOOR PLAN OF CEMENT BAGS FOR BCNM1/BCNHSM1 WAGON

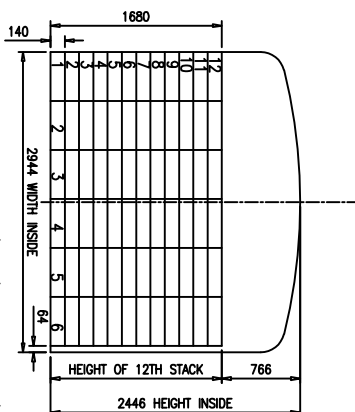
Nos. of cement bags = 1281 (Bag size :Length = 720mm, Width = 418mm & height =140 mm)
Standard weight of each bag = 50 kg



Technical drawing of a door frame assembly. The drawing shows a cross-section of the door frame and the door itself. The door is labeled "DOOR" and has a height of 1204. The frame is labeled "FRAME" and has a height of 1204. The door is shown in an open position, with the frame and door meeting at a hinge. The dimensions are indicated by arrows and text labels.

Labels and dimensions:

- DOOR
- 1204
- FRAME
- 1204
- 445
- 1204 DOOR OPENING
- 1885 HEIGHT OF DOOR OPENING



3

NO. of bags in Lengthwise= 3
 NO. of bags in Widthwise= 6

NO. of bags in Lengthwise= 10
NO. of bags in Widthwise= 6

NO. of bags in Lengthwise= 2
 NO. of bags in Widthwise= 5

$$= 2x(6x^3) + (10x^6) + 2x(5x^2)$$

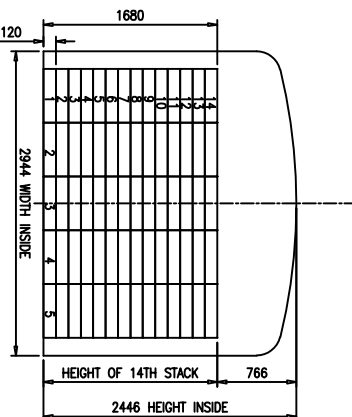
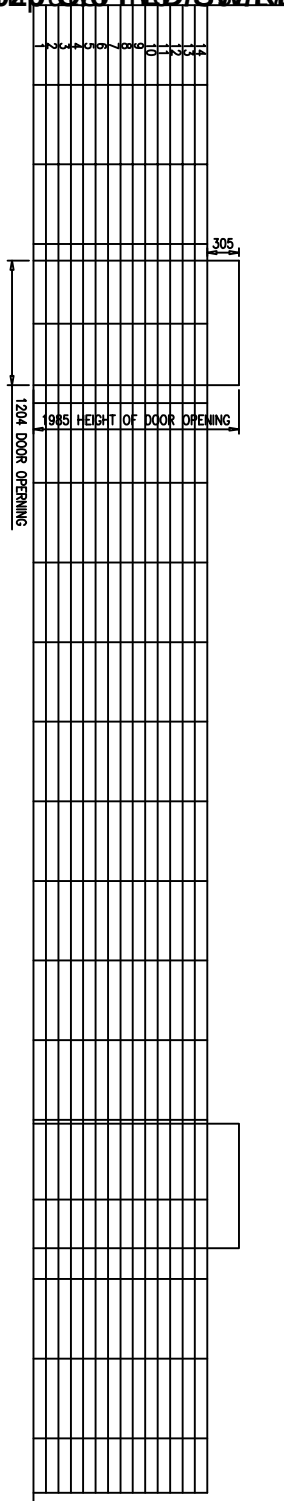
= (1276+5) BAC

$$= 1281 \text{ BAg}(64.05 \text{ T})$$

Figure 1 is a schematic diagram of a 10x10 grid layout. The grid is divided into three main sections by horizontal lines. The top section (rows 1-3) has a width of 1447. The middle section (rows 4-7) has a width of 7144. The bottom section (rows 8-10) has a width of 2471. A total width of 2471 is indicated at the bottom. The grid contains several labeled areas: 'A' in the top center (rows 1-3, columns 4-6), 'B' in the middle center (rows 4-7, columns 4-6), 'C' in the middle left (rows 4-7, columns 1-3), and 'A' in the bottom center (rows 8-10, columns 4-6). There are also 'EMPTY SPACE' labels in the top right (rows 1-3, columns 7-10), middle right (rows 4-7, columns 7-10), and bottom left (rows 8-10, columns 1-3). A small '272' is noted near the top right corner.

Nos. of Fertilizer(Urea) bags = 1281 (Bag size :length = 720mm, width = 480mm & height =140 mm)
Standard weight of each bag = 50 kg

LOADING DIAGRAM FOR LOADING OF FERTILIZER(DAP/NPKF) IN BCNM1/BCNHSM1 WAGON



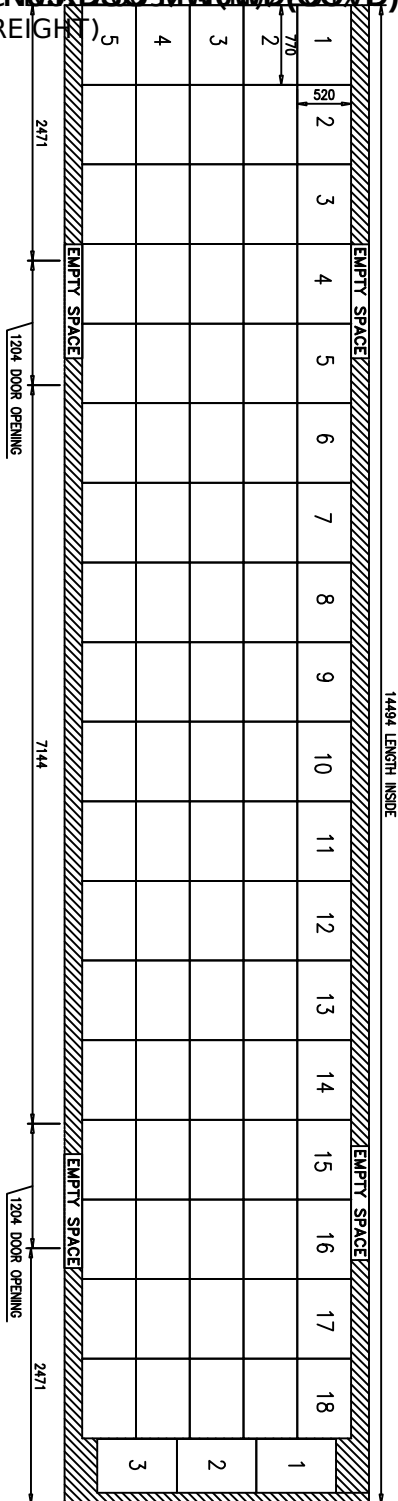
LOADING PATTERN OF FERTILIZER(UREA) FOR BCNM1/BCNHSM1 WAGON

CALCULATION:-

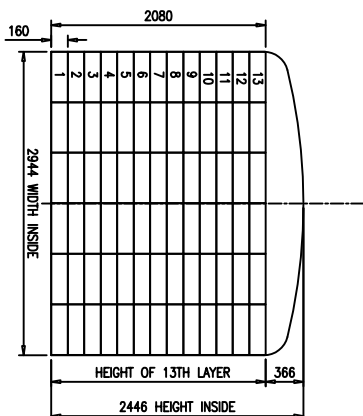
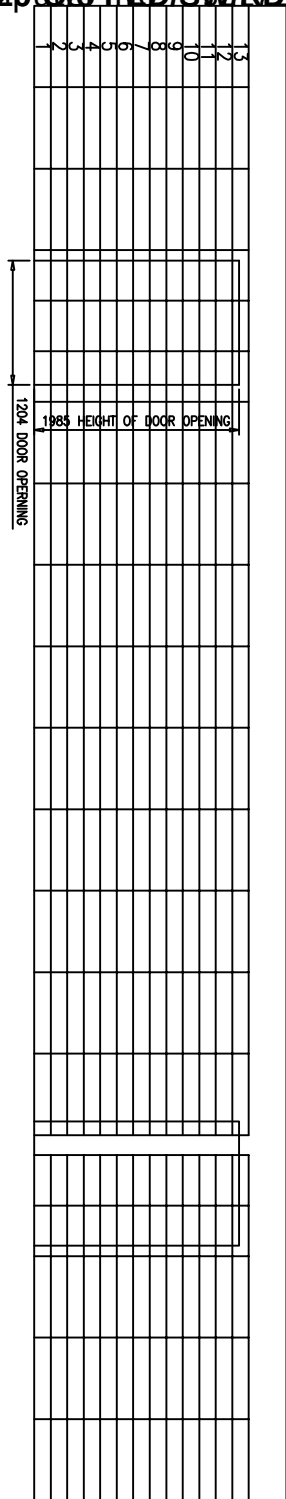
Total No. of Bag in one layer= (18X5)+3=93 Bag
Total No. of Bag in 14 layer=93X13 LAYER+72 BAGS IN 14TH LAYER
= (1209+72) BAG
= 1281 BAG(64.05 T)

FLOOR PLAN OF FERTILIZER(DAP/NPKF) BAGS FOR BCNM1/BCNHSM1 WAGON

Nos. of Fertilizer(DAP&NPKF) bags =1281 (Bag size :length=770mm, Width = 520mm & height =120 mm)
Standard weight of each bag = 50 kg



LOADING DIAGRAM FOR LOADING OF RICE BAG IN BCNM1/BCNHSM1 WAGON



CALCULATION:-

PART:-A

NO. of bags in Lengthwise= 3
NO. of bags in Widthwise= 6

PART:-B

NO. of bags in Lengthwise= 9
NO. of bags in Widthwise= 6

PART:-C

NO. of bags in Lengthwise= 3
NO. of bags in Widthwise= 3

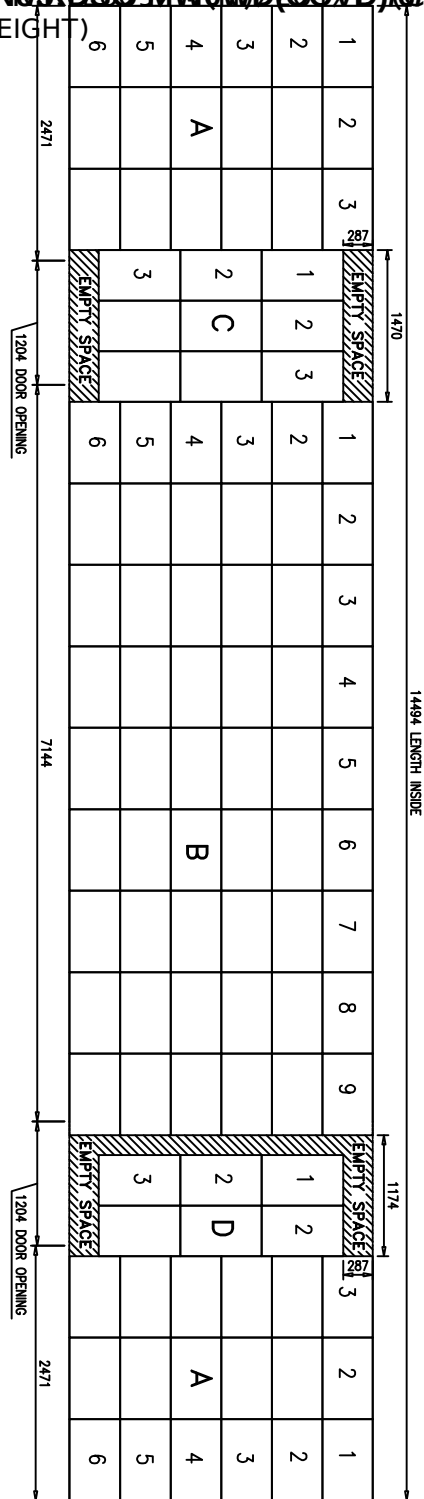
PART:-D

NO. of bags in Lengthwise= 2
NO. of bags in Widthwise= 3

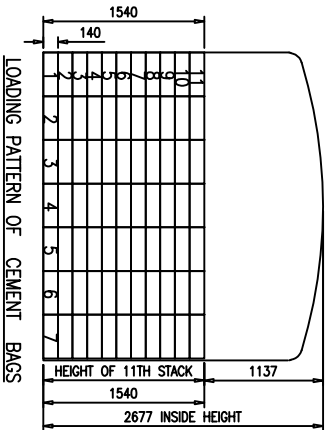
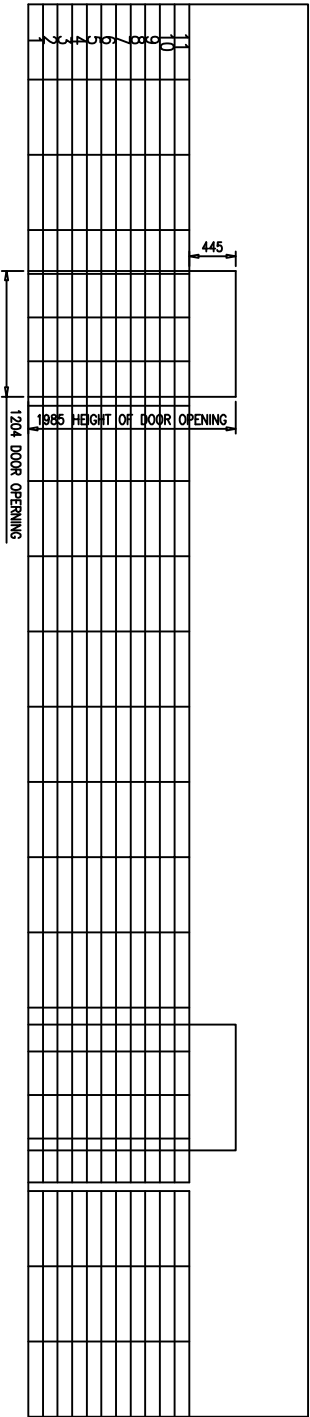
Total No. of Bag in one layer= (2XPart-A)+(Part-B)+(Part-C)+(Part-D)
= 2X(6X3)+(9X6)+(3X3)+(2X3)
= (2X18)+54+9+6=105 Bag
Total No. of Bag in 13 layer=105X12 LAYER+21 BAGS IN 13TH LAYER
= (1260+21) BAG
= 1281 BAG(64.05 T)

FLOOR PLAN OF RICE BAGS FOR BCNM1/BCNHSM1 WAGON

Nos. of Rice bags = 1281 (Bag size :length = 790mm, Width = 490mm & height =160 mm)
Standard weight of each bag = 50 kg



LOADING DIAGRAM FOR LOADING OF CEMENT IN BCNAM1/BCNAHSM1 WAGON



CALCULATION:-

PART:-A

NO. of bags in Lengthwise= 3
NO. of bags in Widthwise= 7

PART:-B

NO. of bags in Lengthwise= 8
NO. of bags in Widthwise= 7

PART:-C

NO. of bags in Lengthwise= 4
NO. of bags in Widthwise= 3

Total No. of Bag in one layer= (2XPart-A)+(Part-B)+(2XPart-C)

= 2X(7X3)+(8X7)+ 2X(4X3)

= (2X21)+56+(2X12)=122 Bag

Total No. of Bag in 11 layer=122X10 LAYER+114BAGS IN 11Th LAYER

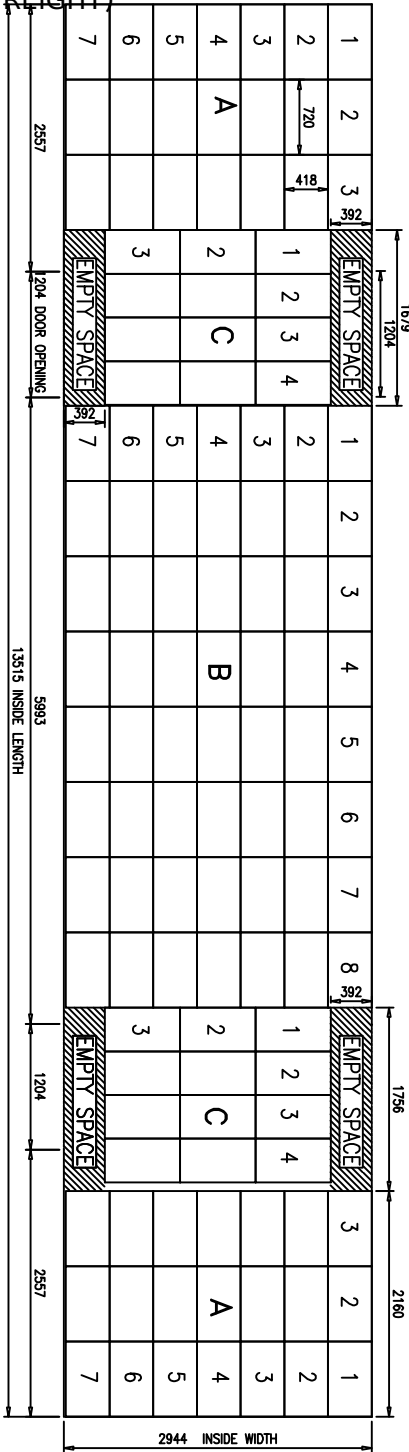
= (1220+114) BAG

= 1334 BAG(66.7 T)

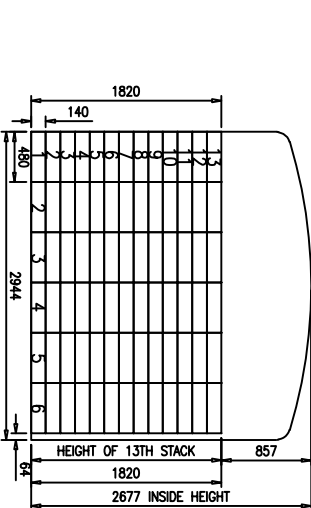
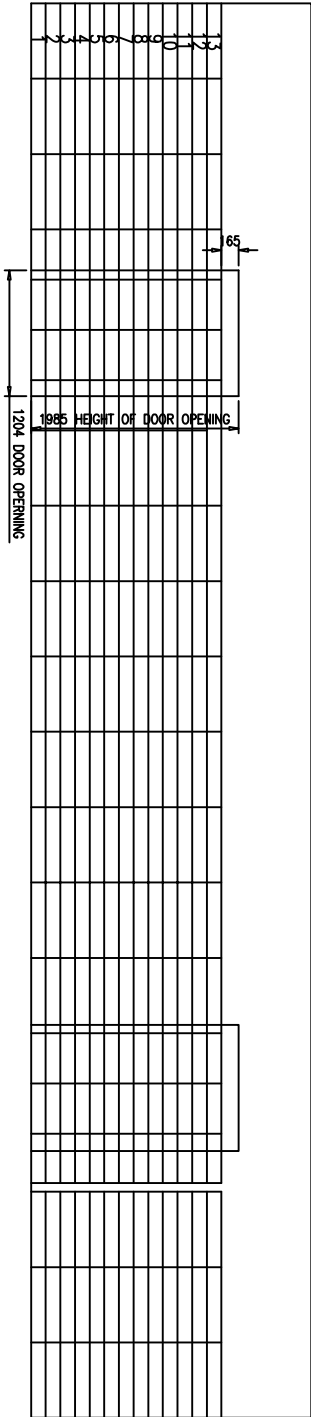
FLOOR PLAN OF CEMENT BAGS FOR BCNAM1/BCNAHSM1 WAGON

Nos. of cement bags = 1334 (Bag size :Length = 720mm, Width = 418mm & height =140 mm)

Standard weight of each bag = 50 kg



LOADING DIAGRAM FOR LOADING OF FERTILIZER(UREA) IN BCNAM1/BCNAHSM1 WAGON



LOADING PATTERN OF FERTILIZER FOR BCNAM1/BCNAHSM1 WAGON

CALCULATION:-

PART:-A

NO. of bags in Lengthwise= 3
NO. of bags in Widthwise= 6

PART:-B

NO. of bags in Lengthwise= 8
NO. of bags in Widthwise= 6

PART:-C

NO. of bags in Lengthwise= 4
NO. of bags in Widthwise= 3

EXTRA NO. of bags in Lengthwise= 2

PART:-D

NO. of bags in Lengthwise= 3
NO. of bags in Widthwise= 3

EXTRA NO. of bags in Lengthwise= 2

Total No. of Bag in one layer= (2XPart-A)+(Part-B)+(Part-C)+(Part-D)

= 2X(6X3)+(8X6)+ {(4X3)+2} + {(3X3)+2}

= (2X18)+48+14+11=109 Bag

Total No. of Bag in 13 layer=109X12 LAYER+26 BAGS IN 13TH LAYER

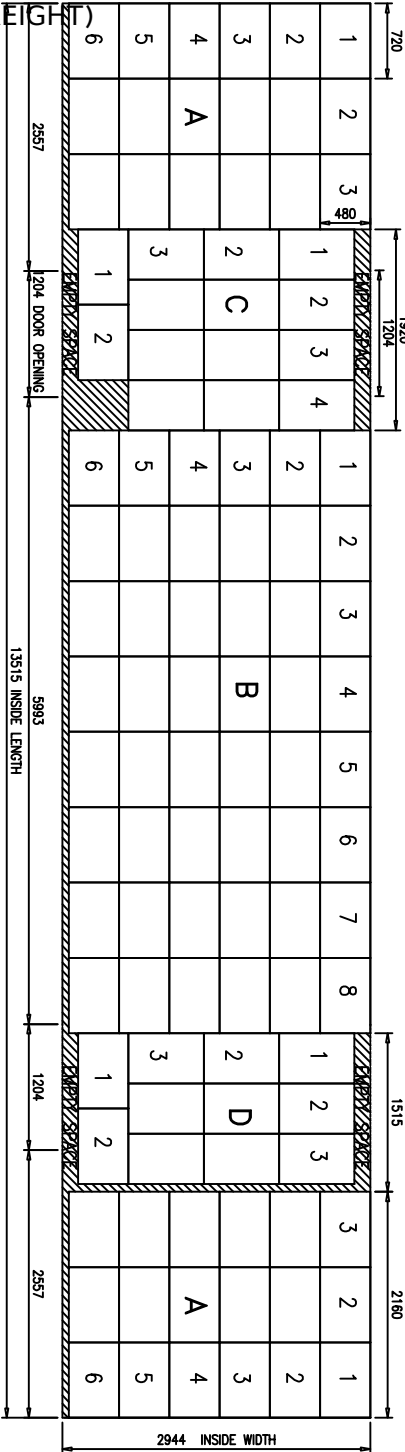
= (1308+26) BAG

= 1334 BAG(66.7 T)

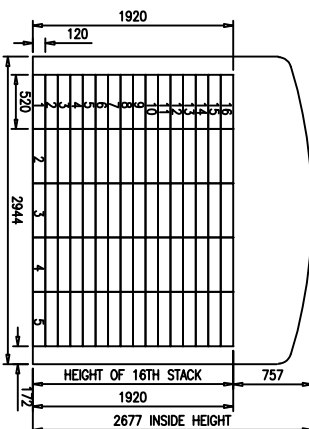
FLOOR PLAN OF FERTILIZER(UREA) BAGS FOR BCNAM1/BCNAHSM1 WAGON

Nos. of Fertilizer(Urea) bags = 1334 (Bag size :length = 720mm, Width = 480mm & height =140 mm)

Standard weight of each bag = 50 kg



PAGE-3 OF 4



CALCULATION:-

Total No. of Bag in one layer= $17 \times 5 = 85$ Bag

Total No. of Bag in 16 layer=85x15 LAYER+59 BAGS IN 16th LAYER
= (1275+59) BAG
= 1334 BAG(66.7 T)



Nos. of Fertilizer(DAP&NPKF) bags =1334

Standard weight of each bag = 50 kg

