



CALCULATION OVERHEAD CRANE DOUBLE GIRDER

COMPANY	PASCO
PROJECT NAME	BILLET
TAG NAME	CMII
REVISION .DC	A
IDD CODE	PASCO-BILLET-CMII-A-650T-51M-M5

In accordance with the standard :

CMAA

CHECK LIST

<i>S/H</i>	14.57	OK
Deflection Girder	67.4	NO
Wheel Base (4 W)	0.10	NO
<i>b / T4</i>	32.8	OK

<i>S/B</i>	28.3	OK
<i>STRESS GIRDER</i>	201.8	OK
<i>Rail Size Traversing</i>	A120	OK
<i>Shear Streess</i>	54.9	OK

<i>H/B</i>	1.9	OK
<i>Stress EC 8W</i>	665.8	NO
<i>Rail Size 8w</i>	70 X 40	NO
<i>Wheel Base (8 W)</i>	0.1	NO

BEARING 4W	REDESIGN
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BEARING 8W	REDESIGN
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GENERAL DATA

Q	650	Load	<i>T</i>
S	51	Span	<i>M</i>
DF	1.1	Dynamic factor	---
WG	M5	Working group	<i>ISO</i>
H.O.L	5000	Height Lift	<i>MM</i>
S1	2500	Approach Side Max	<i>MM</i>
S2	2000	Approach Side min	<i>MM</i>
DFG	L/800	Deflection Girder limit	---
Material	ST - 52	Material Girder	----
SF	1.1	Safety Factor	----

Weight Accessories

PS	0	Power Supply	<i>KG</i>
CE	0	Cubicle Electrical	<i>KG</i>
SP	0	Service Platform	<i>KG</i>
CABIN	0	Cabin	<i>KG</i>

E	210	Elastic modulus	<i>GPA</i>
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Trolley Hoist Data

NTw	16	No.Wheel	----
L	2000	No.Wheel	<i>MM</i>
DT	500	Diameter Wheel Trolley	<i>MM</i>
TS	20	Trolley Speed	<i>M/MIN</i>
Wt	50000	Weight Trolley	<i>KG</i>
HS	6	Hoist speed	<i>M/MIN</i>
RTS	A120	Rail Traversing	<i>MM</i>
MRTS	700	Material Rail Traversing	<i>ST</i>
RG	2000	Rail Gauge	<i>MM</i>
Drum	320	Diameter Drum Hoist	<i>MM</i>
Reeving	24/2	Reeving Hoist	---

ML	SINGLE_15401	Forged Hook	---
MH	4	Model Type Hook	----
CH	T	Class Type Hook	----



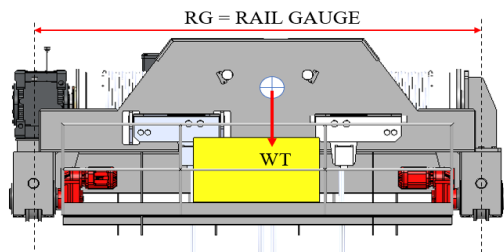
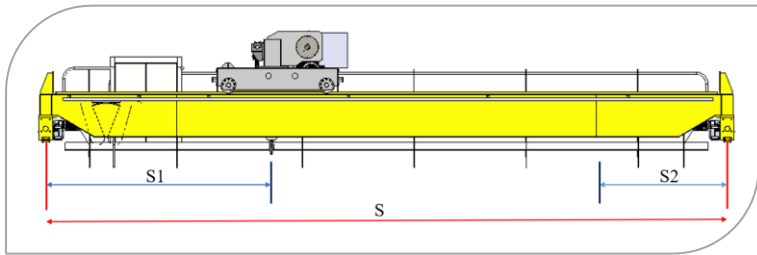
SINGLE 1540



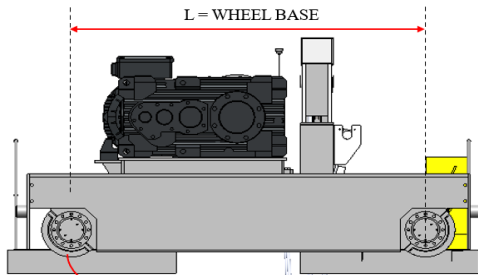
DUPLEX 15402



DUPLEX 15402 B



SWL (KG)



DT = DIAMETER WHEEL



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EC 8 WHEEL



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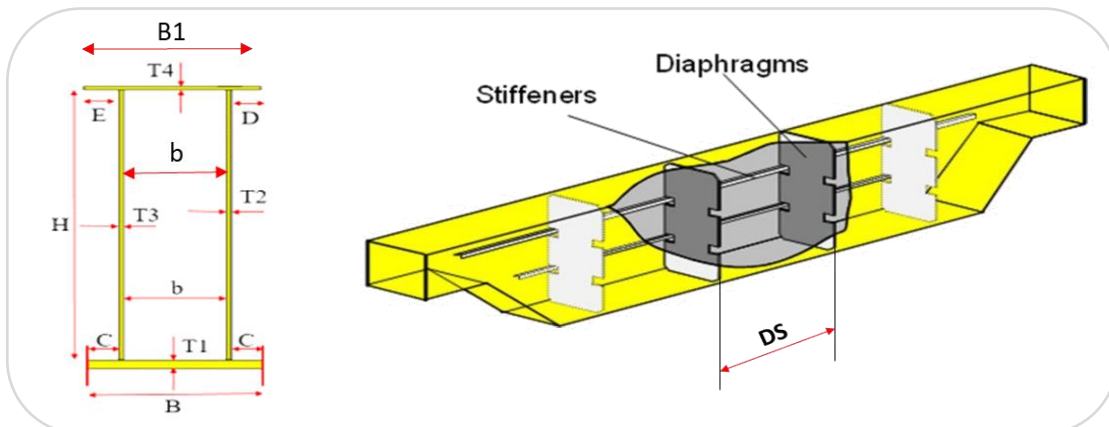
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Input Main Girder

B1	2000	Width Top Flange	mm
H	3500	Height Web	mm
B	1800	Width Bottom Flange	mm
T1	50	Thickness Bottom Flange	mm
T2	30	Thickness Web 1	mm
T3	30	Thickness Web 2	mm
T4	50	Thickness Top Flange	mm
C	50	Space Flange	mm
D	50	Space Flange	mm
E	50	Space Flange	mm
RN	4	Row Number	mm
SF	100 X 100 X 8	Size Stiffener	mm
DS	1800	Diaphragm Distance	mm
DF-TH	12	Diaphragm thickness	mm
Weld	10	Thickness Weld Girder	mm

b	1640	Web Distance	mm
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End Carriage

H	550	Height Web	mm
B	250	Width Top & Bottom Flange	mm
T1	12	Thickness Bottom Flange	mm
T2	10	Thickness Web 1	mm
T3	10	Thickness Web 2	mm
T4	12	Thickness Top Flange	mm
C	15	Space Flange	mm

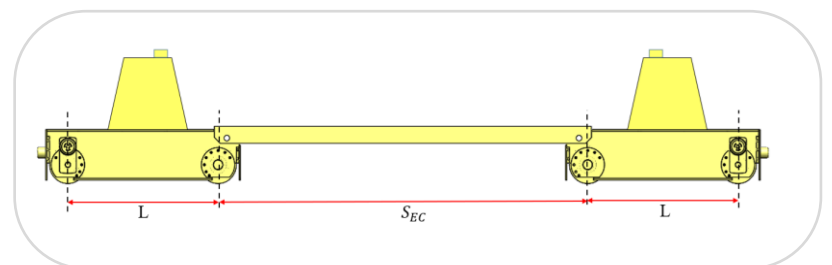
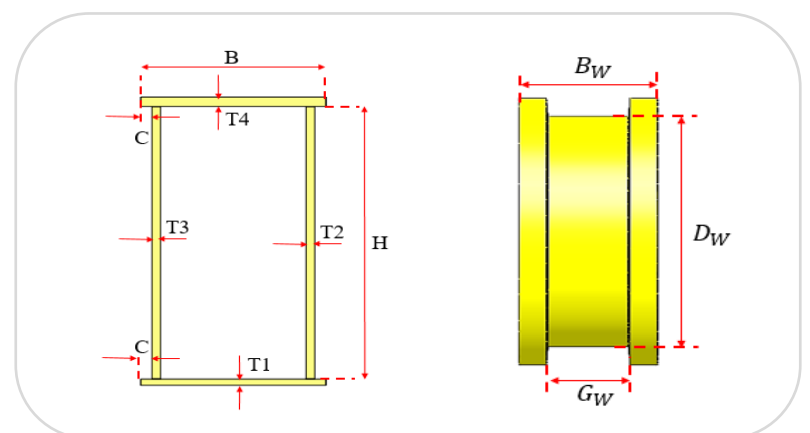
XC	5	WELD THICKNESS	mm
GD	A7	Amplifying coefficient	FEM
BS	40	Bridge Speed	m/min

MR	700	Material (Rail)	mm
SKF	Auto	Bearing	----
RT	70 X 40	Rail Type	mm

L	1800	Distance between center wheel	mm
S_{SE}	2800	Distance between center wheel	mm
BW	180	Wheel Width	mm
DW	630	Diameter Trolley	mm
GW	80	Wheel Groove	mm

Selection Design Girder :

H1	300	mm
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EC 8 WHEEL



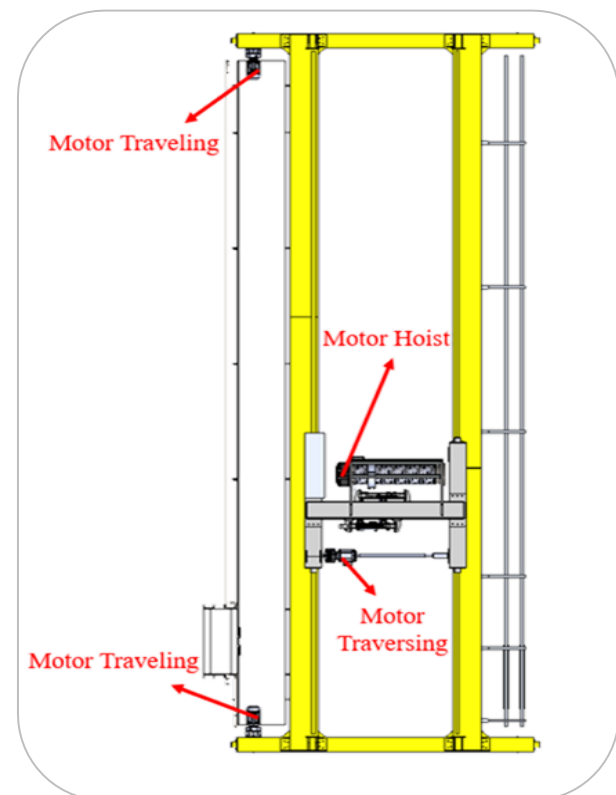
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Data Motors

S3	0.6	Operating mode Traveling	---
S3	0.6	Operating mode For Traversing	---
S3	0.6	Operating mode For Hoist	%
T	40	Ambient temperature	C^0
H	2000	Installation altitude above sea level	m
f	Top Running	Rolling Friction of Drive	----
E	Sleeve	Mechanical efficiency Of Drive machinery	----
TM	AC Inverter	Type Of Motor	----
TC	Inverter	Type of control	----
RS	1500	Speed Range	----



General Check of Dimensions

$S/H < 25$	14.6	OK	mm
$S/B < 65$	28.3	OK	mm
$1.6 < H/B < 2.7$	1.9	OK	mm
$b/T4 < 39$	32.8	OK	mm

Elastic section modulus

Point	S_x	S_y
1	462653287	190759380
2	476215861	200064715
3	476215861	200064715
4	440390743	234361524
5	452662168	248565253
6	452662168	248565253
7	462653287	221693333
8	476215861	221693333
9	476215861	221693333
10	440390743	210324444
11	452662168	234361524
12	452662168	234361524

Unit : mm^3

Moment of inertia

I_x	8.12246E+11	mm^4
I_y	2.05066E+11	mm^4

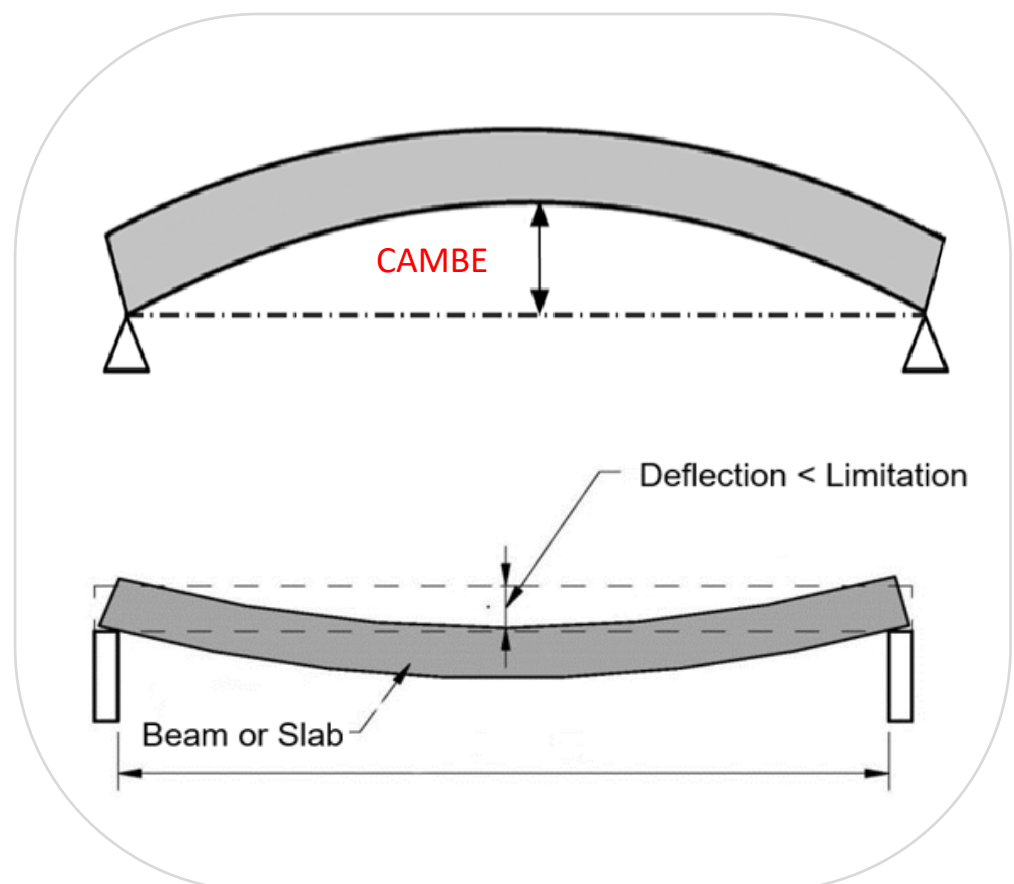
WGWR	Weight Girder Without Rail	182128.3	KG
WG	Weight Girder With Rail	187228	KG
WGWR	Weight Rail	5099.75	KG

LLD	67.44	Live Load Deflection	mm
DLD	19.0	Dead Load Deflection	mm
Camber	52.68	Camber Girder	mm
Y Max	86.40	Max Deflection	mm

Y Max	86.40	Deflection Bridge	NO
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Y Max	18.96	Dead Load Deflection Girder	OK
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DFG	L/800	Deflection Girder limit	---
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EC 8 WHEEL

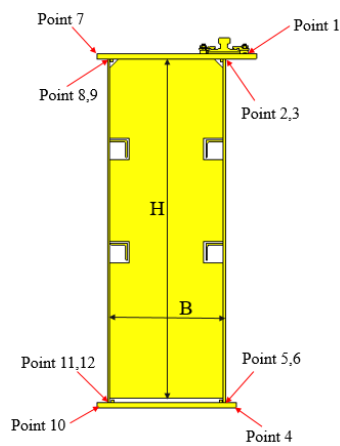


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Stress Main Girder

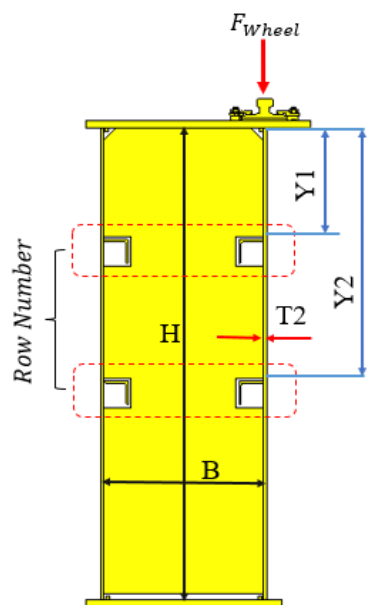
Point	$\sigma x1$	$\sigma x2$	$\sigma x3$	σx (total)	t_{xy1}	t_{xy2}	t_{xy} (wh)	t_{xy} (total)	σz	σ_{eq}
1	-151	-29	0	-180	0	0	0	0	0	180
2	-147	-27	0	-174	11	7	9	27	-45	164
3	-147	-27	0	-174	11	7	9	27	-45	164
4	159	23	0	182	0	0	0	0	0	182
5	155	22	0	177	11	8	0	19	0	180
6	155	22	0	177	32	21	0	54	0	200
7	-151	-25	0	-176	0	0	0	0	0	176
8	-147	-25	0	-172	11	7	0	18	0	175
9	-147	-25	0	-172	30	20	0	50	0	192
10	159	26	0	185	0	0	0	0	0	185
11	155	0	0	178	11	8	0	19	0	181
12	155	0	0	178	32	22	0	55	0	202



Rail Size Traversing

P Max	481250.00	Max Wheel Load	KN
$B_{eff\ min}$	102.01	Min Width for Rail	mm
B_{eff}	106.67	Width for Rail	mm
RTS	A120	Selection Rail Traversing	OK

Buckling Box Diaphragm



Size Stiffener	100 X 100 X 8
Row Number	4

Buckling Stiffener		
$H / T2$ or $T3 < 160$	116.667	Don't Need first buckling stiffener
$H / T2$ or $T3 < 320$	116.667	Don't Need first buckling stiffener

F_{wheel}	8486.5	KN
τ_{act}	20.206	Mpa
Acting Shear Stress		

Row Number	Y1	Y2	Y3
1	700		
2	490	1155	
3	385	840	1470

Calculate End Carriage

Parameter	8 Wheel	Description	Unit
RPM_{wheel}	20.2	ANGULAR VELLOCITY OF WHEEL	Rev/min
P_{Max}	540.8	MAX STATIC WHEEL LOAD WHEN TROLLEY IS SDE OF BRIDGE	KN
P_{Min}	141.9	MIN STATIC WHEEL LOAD WHEN TROLLEY IS SDE OF BRIDGE	KN
P_{dyn}	407.8	MAX DYNAMIC WHEEL LOAD WHEN TROLLEY IS SDE OF BRIDGE	KN
RL	203.9	RADIAL LOAD IN BEARING	KN
AL	51.0	AXIAL LOAD IN BEARING	KN
P_B	#N/A	THE FORCE ACTING ON THE BEARING	KN
L_{10H}	#N/A	BASIC RATING LIFE (AT 90% RELIABILITY) OPERATING HOURS	hr
F_{Max}	2101.1	MAX WHEEL LOAD	KN
F_{Min}	423.4	MIN WHEEL LOAD	KN
M_{Max}	850.9	MAX MOMENT ACTING ON END CARRIAGE	KN.M
M_{Min}	171.5	MIN MOMENT ACTING ON END CARRIAGE	KN.M
S / WB	3618.2	SPAN TO WHEEL BASE RATIO < 7 NOT EXCEED 7	---
F_y	376.7	HORIZONTAL FORCE ACTING ON END CARRIAGE	KN
M_y	376.7	THE MOMENT DUE TO HORIZONTAL FORCE ACTING ON END CARRIAGE	KN.M



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FEM-Group	1	2	3	4	5	6
ISO-Group	M3	M4	M5	M6	M7	M8
WB/S ≥	0.14	0.14	0.16	0.18	0.2	0.2

Total Stress 8 wheel	665.8	NO
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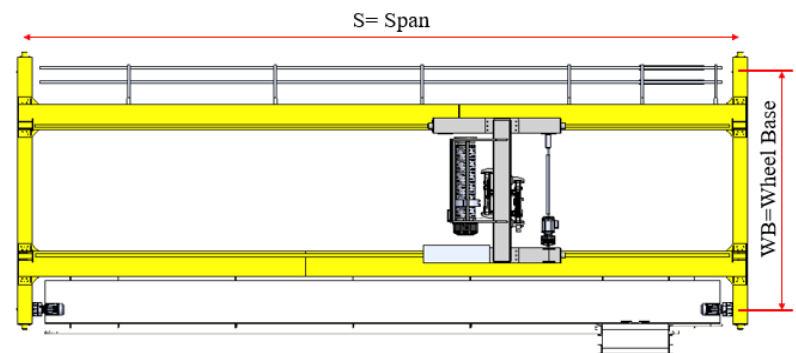
WB / S FOR 8 W	0.12549	NO
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Rail Size for End Carriage 8 W

P Max	448.59	Wheel Load x Safety Factor	mm
$B_{eff\ min}$	79.03	Min Width for Rail	mm
B_{eff}	70.00	Width for Rail	mm

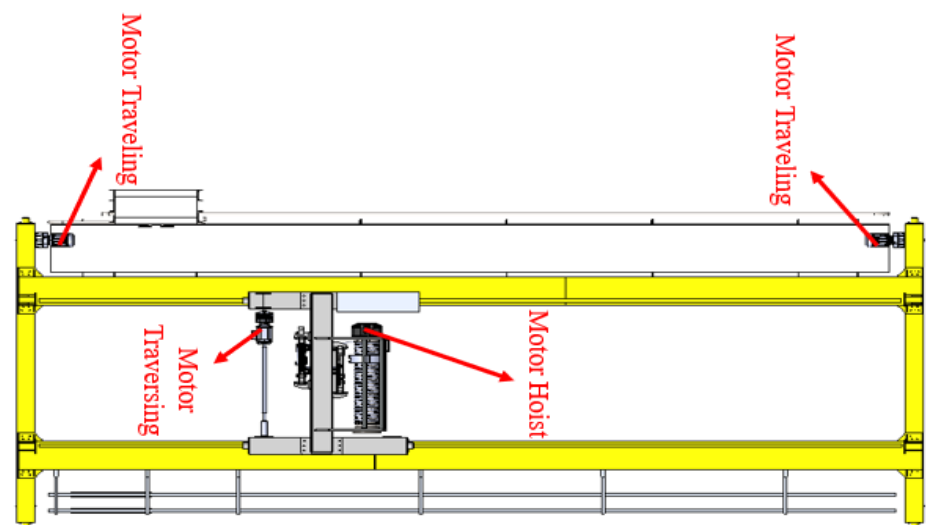
RTS	70 X 40	Selection Rail	NO
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Parameter	8 Wheel	Description	Unit
τ_{Weld}	117.90	SHEAR STRESS OF THE WELD	Mpa
Y_{Max}	0.00	Max Deflection	mm
V	2101.10	MAX SHEAR FORCE	N
σ_{equ}	665.78	TOTAL COMBINED STRESS	Mpa



Crane Motor Design Factors

Parameter	Value	Description
S3 - Traveling	1.10	Cyclic duration factor
S3 - Traversing	1.10	Cyclic duration factor
S3 - Hoist	1.10	Cyclic duration factor
f-T	1.00	Temperature factor
F-H	0.95	Sea level factor
f	15.00	Rolling Friction factor
a	0.25	acc rate traversing
a	0.30	acc rate traveling
Cr- Traversing	1.08	Rotational inertia factor
Cr- Traveling	1.09	Rotational inertia factor
kt	1.50	acc Torque Factor
ks	1.00	acc Torque Factor
E	0.93	Mechanical efficiency
nf	1500	Free Running
nr	1450.00	Full Load Speed

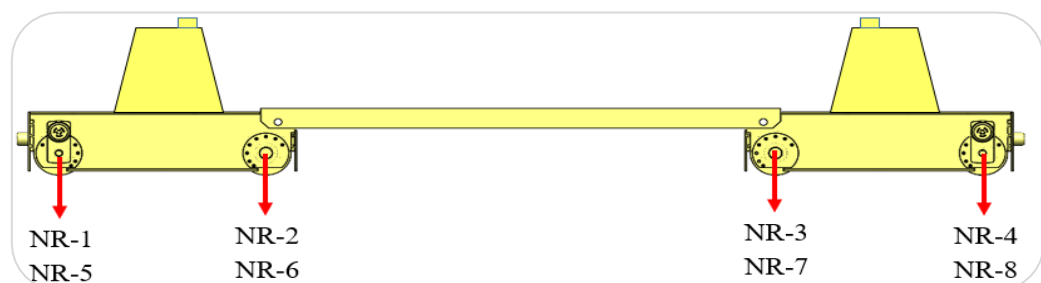


Selection Motors For Crane 8 wheel EC

Parameter	Description	Power (KW)	Round (RPM)
DHM	Hoist Motor	642.09	2.01
DTLM	Traveling Motor	199.91	20.22
DTSM	Traversing Motor	55.55	12.74

Wheel Load For End Carriage 8 Wheel

Wheel	Rmax Stc	Rmin Stc	Rmin Dyn	Rmax Dyn	Unit
NR1	540.8	--	--	2101.1	KN
NR2	540.8	--	--	2101.1	KN
NR3	540.8	--	--	2101.1	KN
NR4	540.8	--	--	2101.1	KN
NR5	--	141.9	407.8	--	KN
NR6	--	141.9	407.8	--	KN
NR7	--	141.9	407.8	--	KN
NR8	--	141.9	407.8	--	KN



2 X Girder

374456



2 X EC 8W

5466



TOTAL CRANE 8W

435387