

SCAFFOLDING CALCULATION SHEET

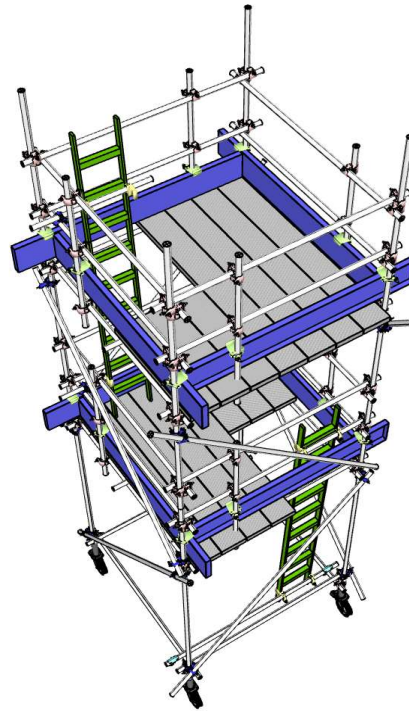
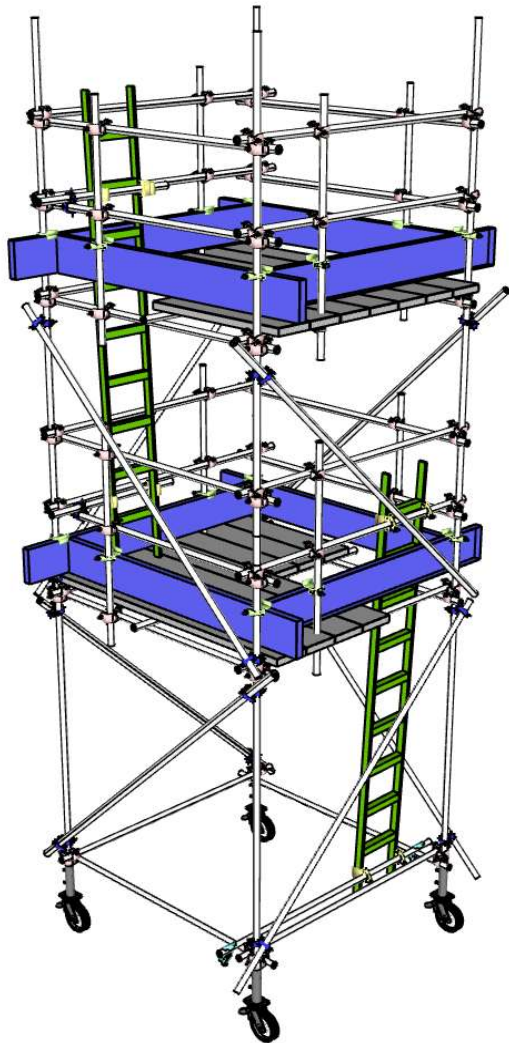
Design Report detail

Object : Bs standard scaffolding standing type

Purpose of Use : Scaffolding for work at high

Project Conclusions ,Condition And Limited Of Use

- Design load is 75 kg/m²
- Client/End user must be make sure the load is not over limit of designed scaffold.



REV.01	ISSUED FOR INSTALL SCAFFOLDING				
REV.00	ISSUED FOR INSTALL SCAFFOLDING	24-07-26			
REV	DESCRIPTION	DATE	BY	CHK.	APPR.



Properties Material Design

Use **Steel scaffold tube 48.3x3.2 mm.**

D_o :Outside Diameter	=	48.30 mm.
t :Thickness	=	3.20 mm.
W :Unit Weight	=	4.37 kg/m.
A :Section area	=	4.53 cm ²
I_x, I_y :Moment of inertia	=	11.60 cm ⁴
Z_x, Z_y :Modulus of section	=	4.86 cm ³
r_x, r_y :Radius of gyration	=	1.60 cm.
E :Modulus of elasticity	=	2,100,000 ksc.
EI :Modulus of elasticity x Moment of inertia	=	2.44E+07
F_y :Yield strength	=	2,450.00 ksc.
F_u :Tensile Strength	=	4,000.00 ksc.
K :Effective Length Factors (Pined - Pined Support)	=	1.00

Fitting

Type	Load Type	Safe Working load (kg.)	Unit weight (kg/pcl.)
Putlog Coupler	Force to pull the tube axially out of the coupler	637.50	1.00
Right Angle Coupler	Slip along a tube	637.50	1.10
Swivel Coupler	Slip along a tube	637.50	1.13
Beam Clamp	Slip along a tube	2,940.00	1.50
Plank Clamp	Slip along a tube	637.50	0.72
Joint Sleeve	Tension	316.20	1.50

Scaffold Boards (Metal)

Unit Weight	=	0.0025 kg/cm ²
I_x :Moment of inertia	=	207.19 cm ⁴
EI :Modulus of elasticity x Moment of inertia	=	4.35E+08

Permissible Load		
Suppoer Intervals	Permissible Load	Deflection
90 cm.	0.030 kg/m2	0.15 cm.
120 cm.	0.018 kg/m2	0.60 cm.
150 cm.	0.018 kg/m2	0.60 cm.
180 cm.	0.015 kg/m2	0.90 cm.

Access Ladders - Aluminum

Unit Weight	=	0.04 kg/cm
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Ledder Beam : Steel scaffold tube 48.3x3.2 mm.

Unit Weight	=	0.11 kg/cm
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Design Criteria

- AISC/ASD 360-2010 : Specification for Structural Steel Buildings
- BS EN 12811-1:2003 Temporary works equipment. Scaffolds. Performance requirements and general
- BS EN 12811-2:2004 Temporary works equipment. Information on materials
- BS EN 12811-3:2002 Temporary works equipment. Load testing
- EN 74-1:2005 Couplers, spigot pins and baseplates for use in false work and scaffolds.
- BS-1139 "Metal Scaffolding"
- BS-2482 "Specification for Timber Scaffold Boards"
- Gin Wheels - Refer to BS-5973

Dead Load Steel scaffold tube 48.3x3.2 mm. Bay 1.50x3.60x20.00 m3

Scaffold Tubes

Pipe 1.00 m.
Pipe 1.50 m.
Pipe 2.00 m.
Pipe 2.50 m.
Pipe 3.00 m.
Pipe 3.50 m.
Pipe 4.00 m.
Pipe 6.00 m.

Quantity (m)	Weight (Kg.)
0	-
4	26.22
30	262.20
8	87.40
0	-
0	-
0	-
0	-

Fitting

Single
Double
Swivel
Beam Clamp
Plank Clamp
Joint Sleeve

Quantity	Weight (Kg.)
4	4.00
80	88.00
16	18.08
0	-
34	24.48
4	6.00

Scaffold Boards (Metal)

Quantity (cm2)	Weight (Kg.)
80000	200.00

Design Dead load (DL) = 716.38 kg.

Live Load (General Purpose)

Hand Tool = - kg.

Work ability (1man = 80 kg.) Request 2 man = 1.00 kg.

Design scaffold Very Light Duty Type = 0.0075 kg/cm² = 600.00 kg.

Design Live load (LL) = 601.00 kg.

Load Combinations: Allowable Strength Design (ASD) Methods

ตามกฎกระทรวงฉบับที่ 6 พ.ศ.2527 ตามความในพระราชบัญญัติควบคุมอาคาร พ.ศ.2522 ได้กำหนดการรื้อถอนน้ำหนักเนื่องจากน้ำหนักบรรทุกทุกอย่างไว้ดังนี้

DL+LL = 1,317.38 kg.

Support = 4.00 point

Design Load on 1-point = 329.35 kg./point

Design Steel Plank

No. :Steel plank of a transom span	=	7 Pcl.
L :Maximum span length	=	120.00 cm.
DL :Dead Load	=	0.0025 kg/cm ²
LL :Live Load	=	0.0075 kg/cm ²
Load apply to steel plank (DL+LL)	=	0.0100 kg/cm ²

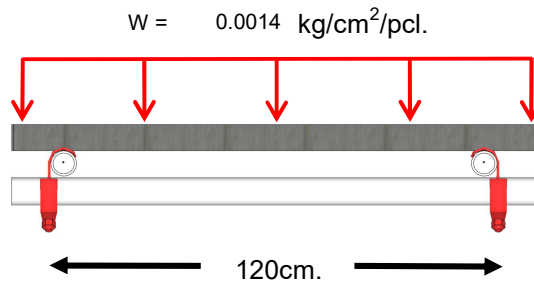
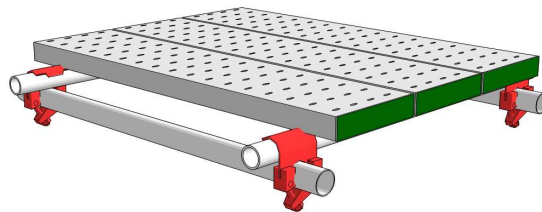
Checking Permissible Load

Maximum Transom span lengt 120.00 cm. Permissible Load = 0.018 kg/cm²
Load apply to each steel plank (DL+LL /No.Steel Plank) = 0.0014 kg/cm² < 0.018 kg/cm² ..OK

Checking deflection

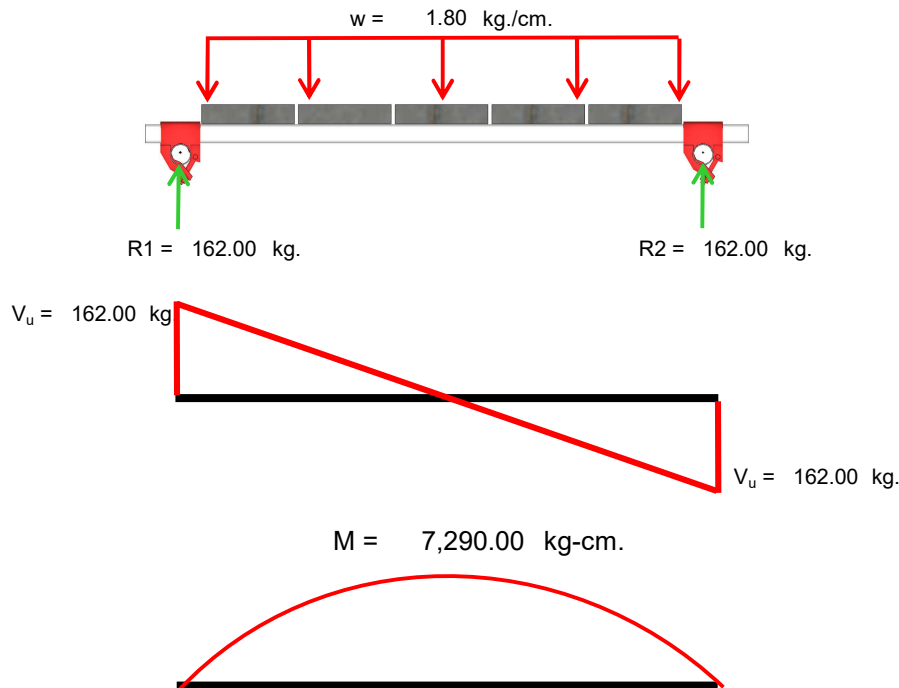
$$\Delta_{At} : \text{Autual deflection} = \frac{5wL^4}{384EI} = 0.006 \text{ cm.}$$

$$\Delta_{AL} : \text{Allowable deflection} = 0.600 \text{ cm.} \quad \Delta_{At} \text{ ..OK}$$



Design Transom

S :Maximum span	=	120.00 cm.
L :Distance Transoms	=	180.00 cm.
DL :Dead Load	=	0.30 kg/cm.
LL :Live Load	=	1.50 kg/cm.
Load apply to transom (DL+LL)	=	1.80 kg/cm.



Maximum shear stress at pipe (Simple span-uniform load pin-pin)

$$V_u : \text{Maximum Shear stress} = \frac{WL}{2} = 162.00 \text{ Kg.}$$

$$M_n : \text{Allowable shear stress} = \frac{0.6F_y dt}{\Omega} = 1,360.50 \text{ Kg.} > V_u \text{ ..OK}$$

Checking bending stress

Maximum bending moment at pipe (Simple span-uniform load pin-pin)

$$M_u : \text{Maximum bending moment} = \frac{WL^2}{8} = 7,290.00 \text{ Kg-cm.}$$

$$M_n : \text{Allowable bending moment} = \frac{F_u Z_{x,y}}{\Omega} = 11,640.72 \text{ Kg-cm.} > M_u \text{ ..OK}$$

Checking deflection

$$\Delta_{At} : \text{Actual deflection} = \frac{5wL^4}{384EI} = 0.842 \text{ cm.}$$

$$\Delta_{AL} : \text{Allowable deflection} = L/200 = 0.900 \text{ cm.} > \Delta_{At} \text{ ..OK}$$

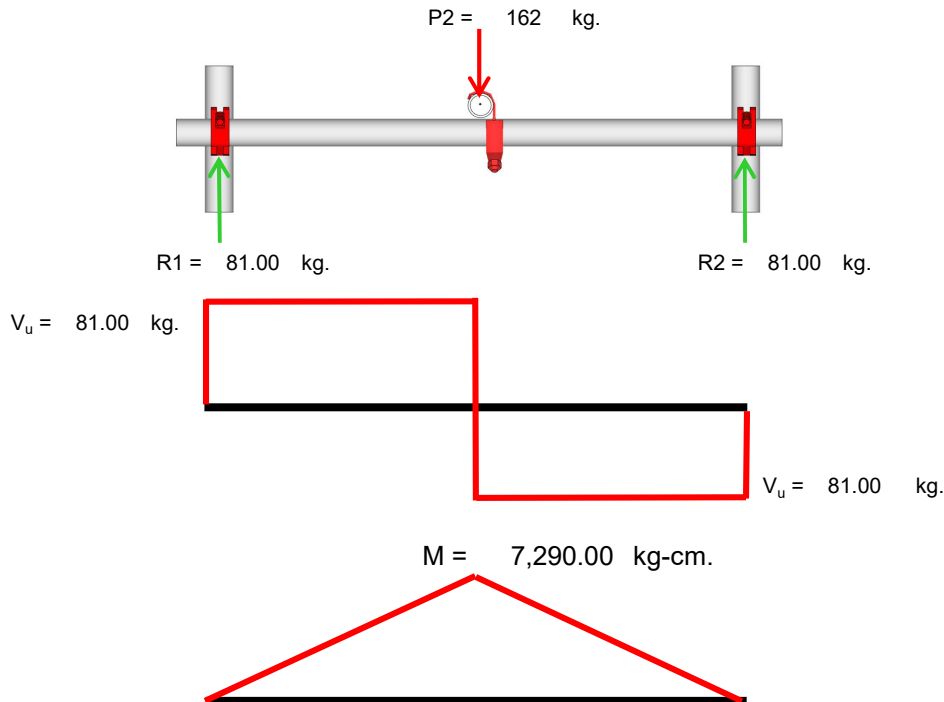
Design Summary

Steel scaffold tube 48.3x3.2 mm could be able to used with safely.

Design Member Beam

S :Maximum span	=	180.00 cm.
L :Distance member	=	180.00 cm.
R :Load transfer from transom to beam	=	162.00 kg.

Load tranfer from transoms



Checking shear stress

Maximum shear stress at pipe (Simple span-uniform load pin-pin)

V_u :Maximum Shear stress	=	81.00 Kg.
V_n :Allowable shear stress	=	1,360.50 Kg. > V_u ..OK

Checking bending stress

Maximum bending moment at pipe (Simple span-uniform load pin-pin)

M_u :Maximum bending moment	=	7,290.00 Kg-cm.
M_n :Allowable bending moment	=	11,640.72 Kg-cm. > M_u ..OK

Checking deflection

Δ_{At} :Autual deflection = $\frac{PL^3}{48EI} + \frac{5wL^4}{384EI}$	=	0.808 cm.
Δ_{AL} :Allowable deflector = $L/200$	=	0.900 cm. > Δ_{At} ..OK

Design Sammary

Steel scaffold tube 48.3x3.2 m could be able to used with safely.

Design Compression Stress Verification

Unbraced length = 200.00 cm.

Design Load on 1-point = 329.35 kg.

Overall Maximum Total Load (Max) on scaffold structure = 330.00 kg.

Factor of Safety (F.s) = 2 factor

Maximum total design loads per point (P_u) on scaffold structure = 660.00 kg.

Checking the buckling along the critical axis (x-y)

According to the condition of section and support which is pinned - pinned at the end of the column $K_x = K_y = 1.0$

$$\frac{KL}{r} = \frac{1.0(200)}{1.60} = 124.98 \text{ ...OK Not more than 200}$$

$$\lambda_c = \frac{KL}{r\pi} \sqrt{\frac{F_y}{E}} = \frac{1.0(200)}{1.60\pi} \sqrt{\frac{2,450}{E}} = 1.36 \text{ Inelastic}$$

Inelastic buckling stress calculation

$$F_{cr} = 0.658^{\lambda_c^2} F_y = 1,131.15 \text{ Ksc.}$$

The nominal load of the section calculation

$$P_n = \frac{F_{cr} A_g}{\Omega} = \frac{1,131.15 \times 4.53}{1.67} = 3,068.34 \text{ Kg.} > P_u = 660.00 \text{ Kg. ...OK}$$

Utilization ratio

$$\frac{P_u}{P_n} = 660.00 / 3,068.34 = 0.22 \text{ ...OK Not more than 1}$$

Checking Jack caster

Jack caster 6" Allowable bearing Stress 450 Kg.

Maximum load on scaffold per point 330.00 kg. < Allowable bearing Stress 450.00 kg. ...OK

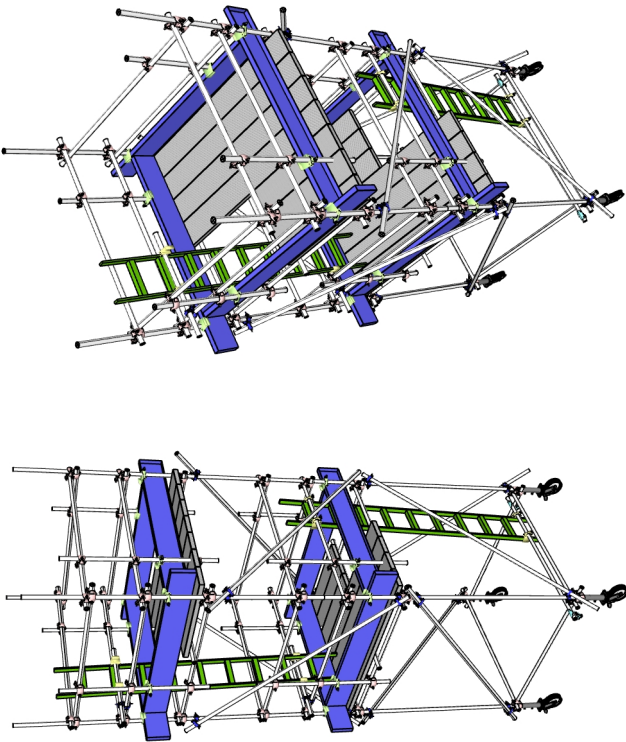


NOTE

- 1.) ต้องมั่นใจว่าล้อหน้ร้านอยู่ในสภาพสมบูรณ์ ไม่ชำรุด
- 2.) ต้องเป็นล้อที่มีระบบเบรค และรับน้ำหนักได้ไม่ต่ำกว่า 450 kg
- 3.) ขณะทำงานต้องมีคนประคองหน้ร้าน เพื่อป้องกันการล้ม

SCAFFOLDING DESIGN FOR VERY LIGHT DUTY TYPE.

Maximum services load on platform not over 75 kg/m².



Isometric View

Scale: <no scale>

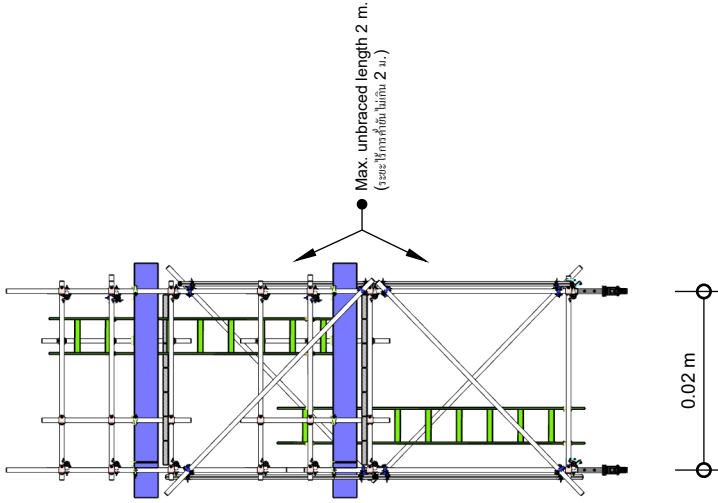
NOTE

- Where a temporary structure erected by contractor impact loads on a permanent structure client must ensure that the permanent structure is of adequate strength resist such forces.
- Designs are carried out in accordance with temporary work code BS EN 12811 Together with EN74:EN39



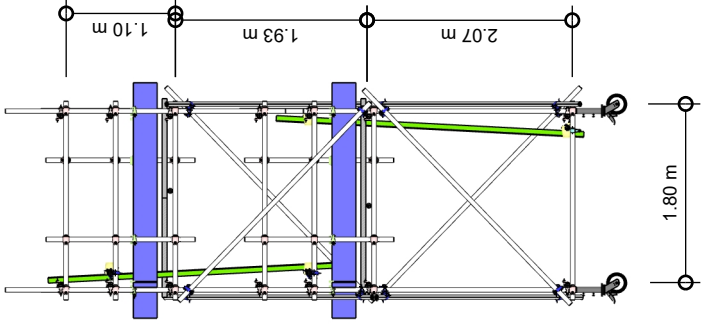
ข้อบังคับขณะใช้งาน

- สำรวจสอยเคลื่อนและระบณเคลื่อนให้อยู่ในสภาพสมบูรณ์และยึดสลักทุกครั้งก่อนใช้งาน
- ตรวจสอบความมั่นคงของโครงสร้าง ใต้เท้า ขาตั้ง (Diagonal Bracing), ข้อต่อ, พื้นปฏิบัติงาน และ Handrail ให้ติดตั้งครบถ้วน
- ตรวจสอบสภาพพื้นรองรับ ต้องแข็งแรงเรียบ และ ไร้ตะขั่ว ไม่มีความลาดเอียงหรือสิ่งกีดขวาง
- ห้ามเคลื่อนย้ายชิ้นส่วนขณะมีผู้ปฏิบัติงานหรือวัสดุอยู่บนโครง และห้ามใช้เป็นจุดยึดหรือแขวนอุปกรณ์
- ใช้งานภายในทิศทางที่กำหนด ไม่บรรทุกเกินกำลัง และหลีกเลี่ยงการทำงานในสภาพลมแรงหรือมีแรงดันข้างมาก



Front View

Scale: <1mm:100mm>

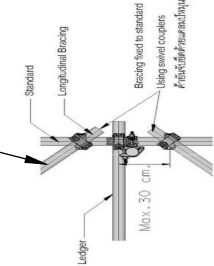


Side View

Scale: <1mm:100mm>



or holding between columns or ledgers only.
(ยึดระหว่างเสาหลักหรือ คานกับคาน เท่านั้น)



DETAIL BRACING CONNECTION

MAX. ALLOWABLE FOR MULTIBAY SLUNG ACCESS				
Load Class	loading	Max. Span of column	Max. Span of transom	
Very Light Duty	75 kg/m ²	2.10 m.	1.20 m.	1.20 m.
Light Duty	150 kg/m ²	1.80 m.	1.20 m.	1.20 m.
General purpose	200 kg/m ²	1.80m.		0.80 m.

PROJECT OWNER

PROJECT NAME

DRAWING TITLE

SHOP DRAWING
SD 2.00x2.00x5.50 m3

SCAFFOLDING ENGINEER

CHECKED BY

DATE

