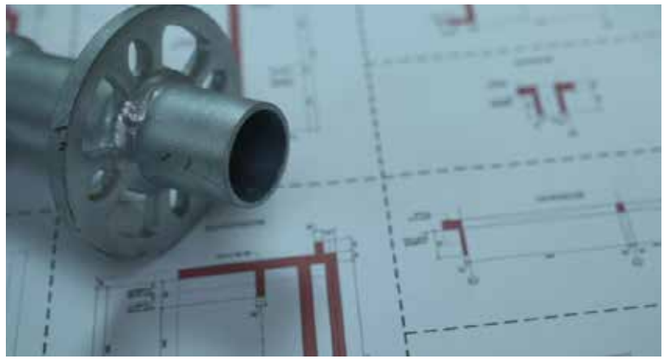
K-RING ACCESS SCAFFOLD

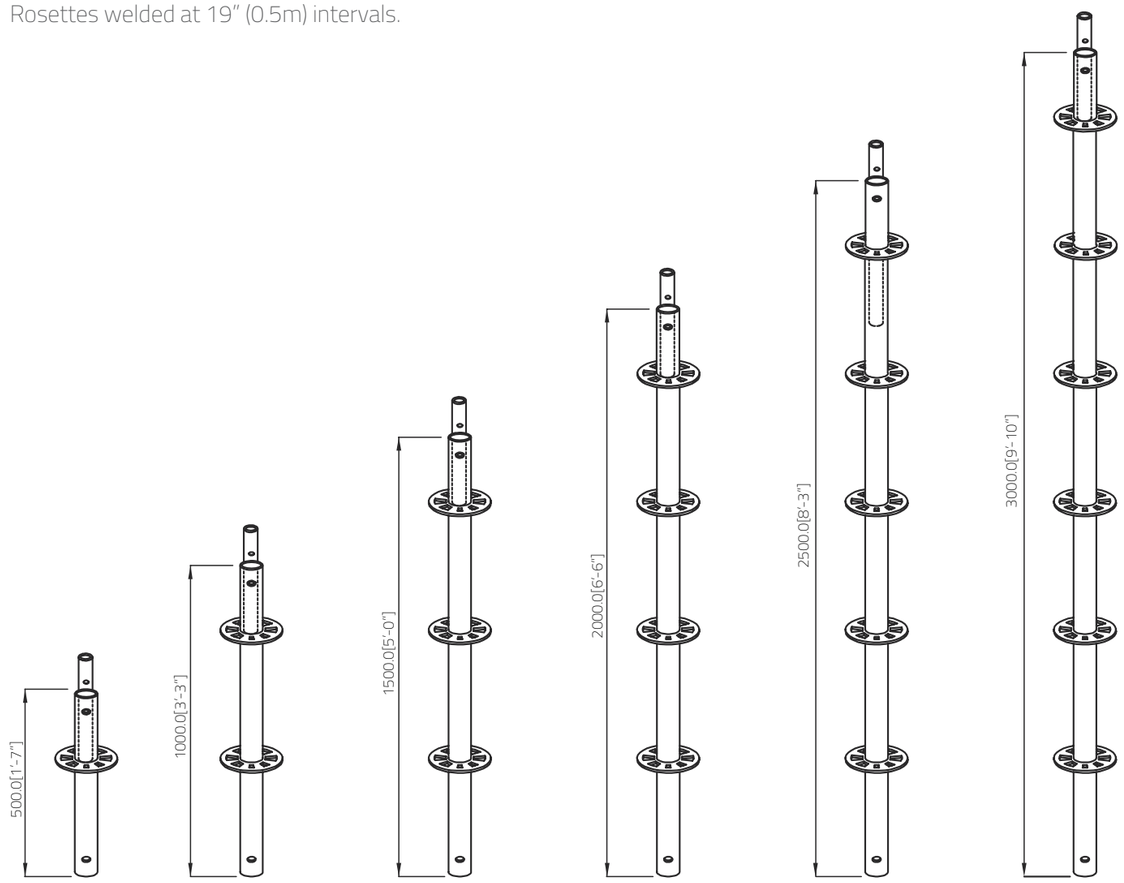
K-RING TECHNICAL DETAILS
K-RING ACCESS SUPPORT SYSTEM:

- K-RING is a modular system scaffold with wedge fixing for all access scaffold requirements.
- The wedge fixing of the ledgers and transoms gives a simple and fast mean of erecting access scaffolding without loose parts.
- Rigid 1 Rosette with slots fixed with Ledger end gives a positive location without movement.
- Spigot and K-Ring starter fitting on the standard to give guaranteed vertical alignment.
- Quality primed hot dipped galvanized finish for maintenance free use.
- Conforms to BS1139 Part 5, HD 1000, OSHA, Australian, New Zealand Standards.



K-RING TECHNICAL DETAILS
K-RING STANDARD:

- K-RING Standards are manufactured from 1.90" S355 grade steel tube, complete with Rosettes welded at 19" (0.5m) intervals.



LENGTH	1'-7"(0.5m)	3'-3"(1.0m)	5'-0"(1.5m)	6'-6"(2.0m)	8'-3"(2.5m)	9'-10"(3.0m)
WEIGHT IN LBS.(KGS)	6.5 (3.1)	11.5 (5.2)	17.0 (7.7)	22.0 (10.0)	26.0 (11.8)	32.0 (14.5)

NOTE: The allowable leg load for the K-Ring standard is 5000 lbs. (22.64Kn) per standard with a Safety factor of 4:1, provided the following criteria is followed.

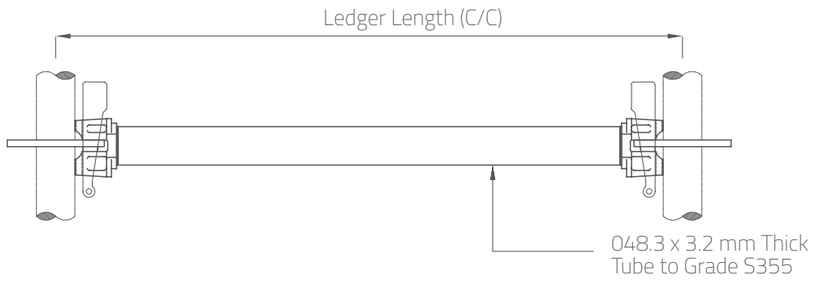
1.) The K-Ring system is erected and used in accordance with OSHA Regulations or CSA 269.2 in Canada, All State and Provincial regulations, Manufacturers recommendations.

2.) The unbraced vertical length of the standard is 6'-6" (2.0m)

K-RING TECHNICAL DETAILS
K-RING LEDGER:

Are made from 48.3 x 3.2 thick tube in Grade S355
With cast steel ledger ends with captive wedge

- K-RING Ledger transfer loads directly to the standard through the positive connection achieved by captive wedge.



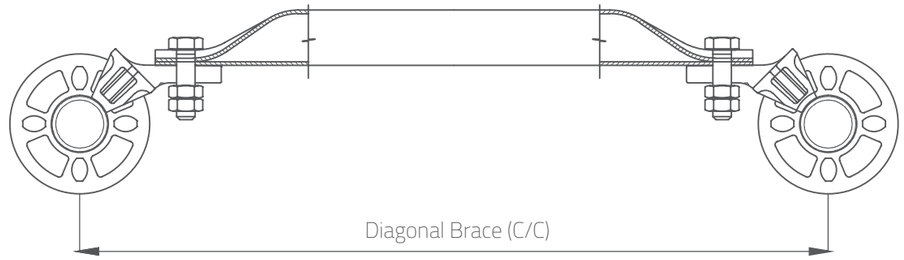
K-RING LEDGER SIZES:

ITEM CODE	LEDGER LENGTH (C/C)	WEIGHT
LED 110	10'-0" (3.05m)	25.0 lbs (11.4kgs)
LED 860	8'- 6" (2.59m)	22.0 lbs (10.0 kgs)
LED 800	8'- 0" (2.62m)	18.0 lbs (8.2kgs)
LED 700	7'-0" (2.13m)	17.8 lbs (8.1 kgs)
LED 600	6'-0" (1.83m)	14.1 lbs (6.4kgs)
LED 520	5'-2" (1.57m)	13.8 lbs (6.3kgs)
LED 500	5'-0" (1.50m)	13.2 lbs (6.0kgs)
LED 400	4'-0" (1.22m)	12.0 lbs (5.45 kgs)
LED 310	3'-10" (1.15m)	10.1 lbs (4.6kgs)
LED 360	3'-6" (1.06m)	9.5 lbs (4.3kgs)
LED 300	3'-0" (0.91m)	9.0 lbs (4.1kgs)
LED 220	2'-2"(0.65m)	6.8 lbs (3.1 kgs)
LED 200	2'-0" (0.61m)	6.2 lbs (2.8 kgs)

NOTE: Ledger length is measured as center of standard as shown.

K-RING TECHNICAL DETAILS
K-RING DIAGONAL BRACES:

- K-RING Diagonal Bracing provide structural stability for system scaffolds and must be installed in accordance with industry guidelines.

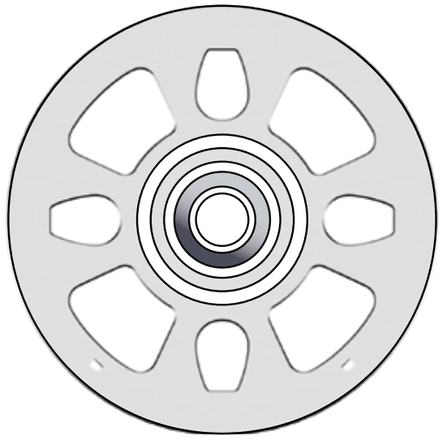


K-RING DIAGONAL BRACES:

ITEM CODE	BAY SIZE (C/C)	WEIGHT
DBB 110	10'-0" (3.05m)	25.0 lbs (11.4kgs)
DBB 860	8'-6" (2.59m)	22.0 lbs (10.0 kgs)
DBB 800	8'-0" (2.62m)	18.0 lbs (8.2kgs)
DBB 700	7'-0" (2.13m)	17.8 lbs (8.1 kgs)
DBB 600	6'-0" (1.83m)	14.1 lbs (6.4kgs)
DBB 520	5'-2" (1.57m)	13.8 lbs (6.3kgs)
DBB 400	4'-0" (1.22m)	12.0 lbs (5.45 kgs)
DBB 310	3'-10" (1.15m)	10.1 lbs (4.6kgs)
DBB 360	3'-6" (1.06m)	9.5 lbs (4..3kgs)
DBB 300	3'-0" (0.91m)	8.6 lbs (3.9 kgs)

NOTE: Diagonal Brace length is measured as center to center of standard as shown.

STANDARDS



Capacity of Standards for given tie patterns:

Capacities taken from frame buckling assessments in calculation package reference #2113-C1.

TUBE TRANSOM	TIE PATTERN	Le (mm)	N (KN)
2.57m x 1.57m 2m Lifts	2m	1796	31.64
	4m	3098	12.59
	4m-s	3206	11.83
	8m	3732	8.97
2.57m x 1.09m 2m Lifts	2m	1773	32.25
	4m	3047	12.97
	4m-s	3151	12.21
	8m	3651	9.33
2.07m x 1.09m 2m Lifts	2m	1773	32.25
	4m	3047	12.97
	4m-s	3126	12.39
	8m	3616	9.50

Capacity of Standards for given effective lengths:

Refer to spreadsheet output for analysis

Le (mm)	1000	1500	2000	2500
N (kN)	63.4	41.0	26.7	18.4

TUBE LEDGERS

From testing, ledger connections have a 0.71 kN.m moment capacity for downwards rotation with a rotational stiffness of 30.95 kN.m/rad. This stiffness is used in the analysis model, with the loads increased until either the support moment (0.71 kN.m) or the section moment (1.40 kN.m, from analysis of standards – see spreadsheet output) is reached.

3070MM TUBE LEDGER

From analysis:

LOAD CONDITION	LOAD	TOTAL LOAD (KN)	DEFLECTION (MM)
UDL	1.1 kN/m	3.4	25.0
CPL	2.0 kN	2.0	25.4
PL's at third points	1.2 kN	2.4	24.8

Max allowable deflection = L/100 = 31mm, or 25mm absolute limit.

2570MM TUBE LEDGER

From analysis:

LOAD CONDITION	LOAD	TOTAL LOAD (KN)	DEFLECTION (MM)
UDL	2.0 kN/m	5.1	23.9
CPL	3.2 kN	3.2	25.3
PL's at third points	1.9 kN	3.8	24.6

Max allowable deflection = L/100 = 26mm, or 25mm absolute limit.

2070MM TUBE LEDGER

From analysis:

LOAD CONDITION	LOAD	TOTAL LOAD (KN)	DEFLECTION (MM)
UDL	3.4 kN/m	7.0	18.5
CPL	3.8 kN	3.8	16.8
PL's at third points	2.7 kN	5.4	19.7

Max allowable deflection = L/100 = 21mm, or 25mm absolute limit.

1572MM TUBE LEDGER

From analysis:

LOAD CONDITION	LOAD	TOTAL LOAD (KN)	DEFLECTION (MM)
UDL	6.6 kN/m	10.4	13.1
CPL	4.8 kN	4.8	10.1
PL's at third points	4.0 kN	8.0	14.0

Max allowable deflection = L/100 = 16mm, or 25mm absolute limit.

1090MM TUBE LEDGER

From analysis:

LOAD CONDITION	LOAD	TOTAL LOAD (KN)	DEFLECTION (MM)
UDL	13.0 kN/m	14.2	6.7
CPL	6.5 kN	6.5	5.1
PL's at third points	-	-	-

Max allowable deflection = L/100 = 11mm, or 25mm absolute limit.

SWIVEL BRACE

Refer to spreadsheet output for analysis.

NOTE: Capacity of swivel brace is limited to the known capacity of the connection, as derived in S-Mech report #2113-C1 unless noted in the tables.

Capacity of Swivel Brace Tube for given effective lengths:

Le (mm)	1000	1500	2000	2500
N (kN)	49.1	32.0	20.9	14.5
KNOWN CONNECTION CAPACITY (kN)	8.4	8.4	8.4	8.4

NB – Ignores connection eccentricity.

Capacity of Swivel Brace for given bay arrangements:

BAY GEOMETRY (WIDTH X LIFT, M)	STRUT LENGTH (MM)	N (kN)	CONNECTION CAPACITY (kN)
0.732 x 2.0	2129	11.2	8.4
1.088 x 2.0	2277	10.4	8.4
1.286 x 2.0	2377	10.0	8.4
1.4 x 2.0	2441	9.7	8.4
1.572 x 2.0	2543	9.2	8.4
2.072 x 2.0	2879	8.0	8.4
2.752 x 2.0	3401	6.4	8.4
3.072 x 2.0	3665	5.8	8.4

NB - Values allow for connection eccentricity of 40mm

Swivel Brace tension capacity:

BAY GEOMETRY (WIDTH X LIFT, M)	STRUT LENGTH (MM)	Tension Capacity N (kN)	CONNECTION CAPACITY (kN)
All	n/a	Connection Critical	11.4

Safe moment capacity: 2.40/ 1.1 x 1.5 = 1.45 kN.m

SHEAR CAPACITY

$$V_{pl,Rd} = \frac{A_v \times \frac{f_y}{\sqrt{3}}}{\gamma_{M0}} \qquad A_v = 2th \qquad A_v = 2 \times 1.5 \times 76 = 228mm$$

$$V_{pl,Rd} = \frac{228 \times (235 / \sqrt{3})}{1.0} \times 10^{-3} = 30.9\ kN$$

SAFE WORKING LOADS

3.07 m:

$$UDL_{max} = \frac{8 \times 1.45}{3.07^2} = 1.23\ kN/m$$

1.23 kN/m / 0.32m = 3.84 kN/m^2 imposed UDL
I_{req} = 2.29 x 1.23 x 3.070^3 = 814996 mm^4 for l/360, 8.5mm.
3070/100 = 30.1mm therefore absolute 25mm limit applies (l/103)
Pro rata for l/123 = 814996 x 123/360 = 278456 mm^4
Section I_{yy} = 499660 mm^4 (effective section) therefore accept deflection check.

2.57 m:

$$UDL_{max} = \frac{8 \times 1.45}{2.57^2} = 1.76\ kN/m$$

1.76 kN/m / 0.32m = 5.5 kN/m2 imposed UDL
Ireq = 2.29 x 1.76 x 2.5703 = 684143 mm4 for l/360, 7.1mm.
2570/100 = 25.7mm therefore absolute 25mm limit applies (l/103)
Pro rata for l/103 = 684143 x 103/360 = 195740 mm4
Section Iyy = 499660 mm4 (effective section) therefore accept deflection check.

2.07 m:

$$UDL_{max} = \frac{8 \times 1.45}{2.07^2} = 2.71\ kN/m$$

2.71 kN/m / 0.32m = 8.5 kN/m2 imposed UDL
Ireq = 2.29 x 2.71 x 2.0703 = 550447 mm4 for l/360, 5.8mm.
2070/100 = 20.1mm
Pro rata for l/100 = 550447 x 100/360 = 152901 mm4
Section Iyy = 499660 mm4 (effective section) therefore accept deflection check.

1.57 m:

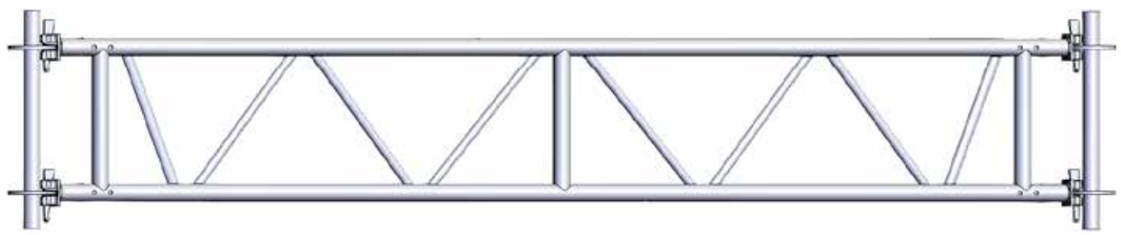
$$UDL_{max} = \frac{8 \times 1.45}{1.57^2} = 4.71\ kN/m$$

4.71 kN/m / 0.32m = 14.7 kN/m2 imposed UDL
Ireq = 2.29 x 4.71 x 1.573 = 417402 mm4 for l/360, 4.4mm.
1570/100 = 15.7mm
Pro rata for l/100 = 417402 x 100/360 = 115945 mm4
Section Iyy = 499660 mm4 (effective section) therefore accept deflection check.

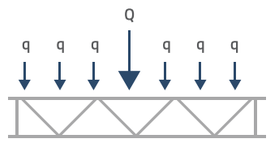
BRIDGING WITH LATTICE GIRDERS

The 500 deep Lattice Girder attaches directly to the rosettes. These Girders must be laced and braced on the chord only to prevent lateral displacement. Tube and fitting can be used or alternatively proprietary K-Ring Components. Design advice is generally always required for this type of arrangement.

Lattice Girder 4.26m **47KG**
Lattice Girder 6.40m **65KG**

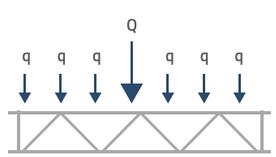


Another solution for creating a bridging, is with the help of K-Ring lattice girders and lattice girder couplers. The lattice girders are available in the system lengths of 4.26m and 6.40m. With these lengths it is possible to bridge two bays of 2.07m, 2.57m or 3.07m. The top side of the lattice girders is fixed to the standards by welded with spigot connections.



Load capacity of lattice girders

HEIGHT	500mm			
SIZE	3.00	4.00	5.00	6.00
PERMISSIBLE UNIFORMLY DISTRIBUTED LOAD, Q(kN/M)	9.0	7.6	5.2	3.3
PERMISSIBLE SINGLE LOAD IN THE CENTRE, Q(kN)	19.8	14.4	18	15.3



Load capacity of lattice girders with wedge

SIZE	4.26	6.4
PERMISSIBLE UNIFORMLY DISTRIBUTED LOAD, Q(kN/M)	3.2	2.9
PERMISSIBLE SINGLE LOAD IN THE CENTRE, Q(kN)	12.3	10.8