## Safety Components Catalog



- SAFETY COMPLIANT
- NO WELDING OR THREADING
- LIGHTWEIGHT AND VERSATILE COMPONENTS
- HIGH CORROSION-RESISTANCE



Safety Rail Source has been building and designing railings and the components used to create rugged pipe structures for over 75 years. The simplicity in the design of these systems is due to the modularity of its parts. Whether you need to protect people, equipment, or your on-site inventory, Safety Rail Source provides the most cost effective safe solutions to your barrier requirements. When you need a safe, reliable, durable and versatile barrier system, there is only one company to think of: Safety Rail Source.

## Safety

Safety Rail Source regularly monitors all new safety standards and directives to ensure the highest levels of safety. Safety Rail Source understands the requirements laid out in today's numerous safety bulletins: OSHA, IBC U.S. Coast Guard, Ontario Building Code, ANSI, Health and Safety, EU Directives \& CDM Regulations to name just a few. Either in the factory, on the construction site, or along the ADA ramp, Safety Rail Source solutions not only meet but exceed the current safety requirements for maximum protection.

## Quality

Quality is the overriding priority when manufacturing Safety Rail Source components. It begins in the foundry where all Flttings are manufactured and galvanized to ISO Standard BS EN ISO 1461 and subject to stringent inspection upon completion. The components are TÜV certiFled for strength, manufacturing quality and consistency.

## Solutions

From simple protection for loading docks or walkways, to safety railings in aggressive coastal environments or the protection of road bridges and culverts, Safety Rail Source can provide a strategic integrated safety solution to meet your safety requirements with absolute conFldence.

pre-galvanized cast iron
fittings for the construction of steel tubular structures

Kee ${ }^{\circ}$ Lite components manufactured from a high grade Aluminum Silicon Magnesium Alloy for creating lightweight tubular structures
barrier railing system designed to meet ADA (Americans with Disabilities Act) requirements


## tech + spec

## Galvanized Steel

Schedule 40 and Schedule 80; size 1/4" to 2" IPS; nominal mill lengths of 21' cut to your projects' exact length requirements

## Powder Coating

Durable, corrosion preventing polyester coating applied to already galvanized/anodized products; available in any RAL color

## Aluminum

Alloy 6105-T5 with an anodized finish; size range $3 / 4$ " to 2 " IPS; nominal mill lengths of $12^{\prime}$ and $24^{\prime}$ cut to your projects' exact length requirements

## Antimicrobial Coating

Defense against the growth of potentially harmful invisible bacteria and fungi; this powder coating can be applied in a wide range of RAL colors

Note:
Safety Rail Source can provide general guidance on the use of the fittings detailed in this catalog. However, the nature of the product means that the ultimate responsibility for selecting the correct fitting for an application rests with the customer. The customer should also ensure that any existing structure to which a Safety Rail Source component is being secured is of sufficient strength to support both the weight of the Safety Rail Source construction and the imposed loads applied, including wind loads, snow loads, and any other superimposed loads.

## Pipe for your Structure

KEE KLAMP safety components are produced in a range of standard sizes to suit Schedule 40 steel pipe, sizes $1 / 4$ " nominal bore to $2^{\prime \prime}$ nominal bore; also equivalent sizes of tubing in other materials.
Tubing of other specifications can be used, providing the outside diameter is compatible with Schedule 40 pipe. Pipe with a wall thickness of less than $1 / 8$ " can only be used in lightly loaded structure.

| pipe reference | component <br> inner dia (in.) | nominal bore (in.) | pipe outer dia (in.) | tube outer dia (in.) |
| :---: | :---: | :---: | :---: | :---: |
| 2 | 0.59 | $1 / 4$ | 0.540 | 0.531 |
| 3 | 0.76 | $3 / 8$ | 0.675 | 0.688 |
| 4 | 0.87 | $1 / 2$ | 0.840 | 0.844 |
| 5 | 1.09 | $3 / 4$ | 1.050 | 1.000 |
| 6 | 1.38 | 1 | 1.315 | 1.313 |
| 7 | 1.72 | $1-1 / 4$ | 1.660 | 1.625 |
| 8 | 1.94 | $1-1 / 2$ | 1.900 | 1.875 |
| 9 | 2.41 | 2 | 2.375 | 2.375 |

## TÜV Approval

Our components are approved by TÜV, Europe's leading independent testing house. The maximum load of each fitting type is as stated
 on the TÜV Certificate, a copy of which is available upon request. For an up-to-date TÜV listing see our website at www.safetyrailsource.com.


## Selecting Kee Safety Components

Every fitting is illustrated and accompanied by a table of sizes and weights. Each fitting has a simple numerical code reference, which is unique and differentiates it from every other fitting. The code defines the type of fitting and the pipe size or sizes it is designed to receive.


## Specifying Components

055200 METAL RAILINGS
PART 1-1 GENERAL
1.1 SCOPE
1.2 RELATED WORK
1.3 RAILING STRUCTURAL REQUIREMENTS
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE

PART 2-2 PRODUCTS

### 2.1 MANUFACTURER

A. Manufacturer of handrail, guardrail or railing systems shall be the following except where otherwise noted on the Drawings:

1. Kee Safety, Inc., Buffalo, NY, USA 1-800-851-5181 2. Kee Safety, Ltd., Concord, ON, Canada 1-877-505-5003

### 2.2 SYSTEMS

A. Handrails and Guardrails: Provide pipe, KEE KLAMP or KEE LITE fittings, and accessories as indicated or required to match design indicated in the Drawings.
B.Guardrails for Hatches and Openings: Coordinate with Section 0772 00, and provide KEE HATCH Safety Railing system consisting of a top rail, mid rail, and chain or swinging gate, with the hatch curb acting as the toe plate. Extended railing system to a height of at least 42 inches (1067 mm ) from the finished roof deck.
C. Roof Edge Guardrails: Coordinate with Section 0772 00, and provide freestanding KEE GUARD Roof Edge Protection System, including pipe railings, uprights, bases, counterweights and fittings.
2.3 METALS
A. Pipe

1. Steel Pipe: ASTM A 53
2. Aluminum Pipe: Alloy 6105-T5 conforming to ASTM B 221
B. Fittings and Castings:
3. Cast Iron Fittings or Castings to comply with ASTM A 47
4. Hot Dip Galvanized finish to comply with BS EN ISO 1461
5. Aluminum Alloy Fittings or Castings conforming to ASTM A 356 T-6
6. Brackets, Flanges, and Anchors: Cast or formed metal of same material and finish as supported rails.
2.4 OTHER MATERIALS
2.5 FABRICATION-GENERAL

PART 3-3 EXECUTION
3.1 EXAMINATION AND PREPARATION
3.2 INSTALLATION
3.3 JOB CLOSE OUT

A brief three part specification for components is shown above for quick reference. The full specification is available for download on the Safety Rail Source website at www. safetyrailsource.com.


## Galvanized Steel Components

Steel pipe is an inherently efficient structural component. It is strong, has no sharp corners, and is readily available worldwide. The difficulty in using steel pipe to form structures arises when joining. Threaded pipe must be supplied in set lengths making for zero flexibility in installation. Welding is labor intensive, requires a highly skilled workforce, and specialized equipment.

The answer is KEE KLAMP components. The underlying principle is simple but highly effective: use slip-on components to create versatile and rigid tubular structures. The KEE KLAMP principle has been developed and refined for more than 75 years resulting in an extensive range of components suited for any need.

## Engineering

The engineering principle behind the KEE KLAMP component is the foundation of the most versatile pipe connection system available. We provide the versatility needed to achieve virtually any structure configuration.

KEE KLAMP fittings are iron castings manufactured to the requirements of ASTM A47-7732510. We have engineered a range of components to suit eight different sizes of pipe. Hexagon set screws firmly lock the component to the pipe. Set screws are manufactured in case hardened steel and are protected against corrosion with our unique protectant called KEE KOAT.

A KEE KLAMP component (size 5 to 9 ) can support an axial load of 2000 lbs. per set screw with the set screw tightened to a torque of $29 \mathrm{lbs} . / \mathrm{ft}$. (rating includes a safety factor of 2:1). This is normally obtained when the set screw is fully tightened using a ratchet wrench.

Fittings by Function

## Bases

$62 \ldots \ldots .$. Standard Railing
$64 \ldots \ldots .$. Vertical Railing
$65 \ldots \ldots .$. Horizontal Railing
$66 \ldots \ldots .$. Ground
$69 \ldots \ldots .$. Rail w/ Toe Adaptor
$262 \ldots \ldots$. Round Flange

## Clips

79..........Sheeting
81..........Single Sided
82...........Double Sided
105........Sheeting w/o hardware
126........Galvanized

## Couplings

14..........Straight
18.........Iternal
$145 \ldots \ldots .$. Crossover

## Crosses

26..........Two Socket A26........Split Two Socket 28..........Two Socket Custom 30.......... $30^{\circ}-45^{\circ}$ Adjustable 35..........Three Socket A35........Split Three Socket 40..........Four Socket A40........Split Four Socket 89...........Two Socket Angle 91..........PGR Two Socket Cross

## Crossovers

17...........Clamp-on
45..........Crossover
46..........Combination Socket Tee

A45........Split
121........Corner

## Elbows

15.......... $90^{\circ}$
20..........Side Outlet
55..........Obtuse Angle

BC53......Swivel
56..........Acute Angle
87..........Angle
92..........PGR

## Flanges

31..........Pallet

C58........Swivel
59..........Spigot
60..........Extra Heavy
61...........Flange
63...........Angle Base
67..........Angle
68..........Wall
70...........Rail Support
115.........Wall
265........Offset Rail Wall
316........Parapet

|  | Swivel Sockets |
| :---: | :---: |
|  | C50.........Single Combination |
|  | F50.........Female Single |
|  | M50........Male Single |
|  | MH50......Male Single Horizontal |
|  | C51........Double |
|  | M51........Male Double Member |
|  | MH51.......Male Double Horizontal Member |
|  | C52........Corner |
|  | M52........Male Corner |
|  | 78/83....Gate Hinge Set |
|  | F151......Gate Fitting |
|  | Tab Panels |
|  | P51.........Offset Double w/ Slot |
|  | P50.........Offset Sing. w/ Slot |
|  | P57.........Single w/ Slot |
|  | P58.........Double w/ CSH |
|  | Tees/Sockets |
|  | 10.........Single Socket |
|  | A10........Split Single Socket |
|  | 12......... $45^{\circ}$ Single Socket |
|  | A12........Split $45^{\circ}$ Single Socket |
|  | 16..........Clamp-on |
|  | 19..........Adjustable Side Outlet |
|  | 21......... $90^{\circ}$ Side Outlet |
|  | A21........Split $90^{\circ}$ Side Outlet |
|  | 25.........Three Socket |
|  | 27..........Three Socket Custom |


| 29. | $.30^{\circ}-60^{\circ}$ Single Socket |
| :---: | :---: |
| 46. | .Combination Crossover |
| 86 | .Angle |
| 88. | Three Socket Angle |
| 90. | .PGR Three Socket |
| 93. | .Pedestrian Guard Rail |
| 114 | . Swivel |
|  |  |
| 77. | .Plastic |
|  | .Malleable |

## Miscellaneous

71..........Weather Cap
72..........Stair Tread Support
75..........Collar
76..........Hook
95..........PGR Internal Spigot
97..........Set Screw
98...........Ratchet Handle w/ Bits
99...........Hex Key
100........Plastic Set Screw Caps

S115......Spacer Plate
118........Rose Cover
350.........Eaves Fitting
351........Ridge Fitting
12585....Fold Up Hex Key

## Kee ${ }^{\circ}$

Klamp

## 10 Single Socket Tee



Designed to give a $90^{\circ}$ butt joint between two pipes. Frequently used for the joint between end uprights and the middle rail where the railing site is straight and level. Also used for base ties on racking. This fitting cannot be used where through pipe is required to be joined within the fitting. Type 25 should be used when a join in the pipe is necessary.


| type | pipe reference |  | measurements (in.) | weight (lb.) |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $A$ | $B$ | $D$ | $E$ |  |
| $10-2$ | 2 | 2 | 1.00 | 0.77 | 0.04 |
| $10-3$ | 3 | 3 | 1.13 | 0.94 | 0.15 |
| $10-4$ | 4 | 4 | 1.36 | 1.20 | 0.29 |
| $10-5$ | 5 | 5 | 1.63 | 1.47 | 0.51 |
| $10-6$ | 6 | 6 | 1.81 | 1.84 | 0.64 |
| $10-65$ | 6 | 5 | 1.75 | 1.42 | 0.55 |
| $10-67$ | 6 | 7 | 2.20 | 2.06 | 0.95 |
| $10-7$ | 7 | 7 | 2.38 | 2.16 | 0.99 |
| $10-75$ | 7 | 5 | 2.25 | 1.44 | 0.71 |
| $10-76$ | 7 | 6 | 2.25 | 1.80 | 0.95 |
| $10-78$ | 7 | 8 | 2.88 | 2.38 | 1.39 |
| $10-8$ | 8 | 8 | 2.69 | 2.38 | 1.28 |
| $10-87$ | 8 | 7 | 2.47 | 2.03 | 1.10 |
| $10-9$ | 9 | 9 | 3.31 | 2.88 | 2.14 |
| $10-98$ | 9 | 8 | 2.94 | 2.50 | 1.43 |

A10-7 Split Single Socket Tee


1-1/4"
Designed to allow additions or extensions to existing structures without the need for dismantling. Pipe must not be joined within the fitting. Fitting has strength and function comparable to Type 10 components.


## A1 $10-8$ Split Single Socket Tee



## 1-1/2"

Designed to allow additions or extensions to existing structures without the need for dismantling. Pipe must not be joined within the fitting. Fitting has strength and function comparable to Type 10 components.


| type | pipe ref. | measurements (in.) |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: |
| A | $D$ | $E$ | ( |  |
| A10-8 | 8 | 3.46 | 2.36 | 1.59 |

## $1245^{\circ}$ Single Socket Tee



Engineered to create $45^{\circ}$ angles. This component is most frequently used for bracing and struts.



15 90 Elbow
A $90^{\circ}$ elbow joint, most frequently

used as an end joint for the top rail of safety railing on a level site.

| type | pipe ref. <br> A | measurements (in.) <br> $D$ | weight (lb.) |
| :---: | :---: | :---: | :---: |
| $15-4$ | 4 | 1.33 | 0.29 |
| $15-5$ | 5 | 1.61 | 0.60 |
| $15-6$ | 6 | 1.81 | 0.86 |
| $15-7$ | 7 | 2.36 | 1.48 |
| $15-8$ | 8 | 2.67 | 1.70 |
| $15-9$ | 9 | 3.34 | 2.82 |

## 16 Clamp-on Tee



Widely used for adding to and modifying existing structures. This performs the same function as a Type 10, but because of its open socket, it can be added to a complete structure. For alternative fitting, see Type A10. Type 25, or Type A26-8 with Type 84-848 top cap, should be used when a join in the pipe is necessary.


| type | pipe ref. <br> $A$ | measurements (in.) <br> $D$ | weight (lb.) |
| :---: | :---: | :---: | :---: |
| $16-5$ | 5 | 1.97 | 0.64 |
| $16-6$ | 6 | 2.05 | 0.73 |
| $16-7$ | 7 | 2.68 | 1.30 |
| $16-8$ | 8 | 2.87 | 1.32 |
| $16-9$ | 9 | 3.54 | 2.03 |

## 17 Clamp-on Crossover



Designed to provide a $90^{\circ}$ crossover joint. Can be added to an existing structure. Pipe should not be joined within this fitting. For alternative fitting, see Type 45 or Type A45.


| type | pipe ref. | measurements (in.) |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: |
| $17-5$ | 5 | 1.06 | 1.61 | 0.33 |
| $17-6$ | 6 | 1.34 | 1.89 | 0.51 |
| $17-7$ | 7 | 1.69 | 2.48 | 0.95 |
| $17-8$ | 8 | 1.93 | 2.68 | 1.23 |
| $17-9$ | 9 | 2.40 | 3.07 | 1.98 |

18 Internal Coupling
An internal spigot providing a flush joint between two pipes of the same diameter. Not as strong as Type 14 and must not be used where a direct tensile load is applied. This fitting can only be used with Schedule 40 steel pipe.

DANGER: Type 18 coupling must not be used as a load bearing joint.


## 19 Adjustable Side Outlet Tee

Used in pairs to form variable angle joints between $90^{\circ}$ and $180^{\circ}$. When calculating cutting lengths for pipe, dimension 'E' should be subtracted to give true pipe length. Types 19-8 and 19-85 can produce an angle range between $60^{\circ}$ and $180^{\circ}$.
Note: pairs sold and priced separately in UK, France, and Germany.

|  | type | pipe ref. |  | measurements (in.) |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | A | B | D | E |  |
|  | 19-5 | 5 | 5 | 2.36 | 1.22 | 0.44 |
| 乐 | 19-6 | 6 | 6 | 2.28 | 1.30 | 0.64 |
| F-sios | 19-7 | 7 | 7 | 2.87 | 1.57 | 0.90 |
| (--) | 19-8 | 8 | 8 | 3.54 | 2.17 | 1.17 |
|  | 19-85 | 8 | 5 | 2.87 | 1.77 | 1.43 |
| - ${ }^{\text {- }}$ | 19-9 | 9 | 9 | 4.33 | 1.93 | 2.18 |

## Kee

Klamp


## $2190^{\circ}$ Side Outlet Tee



## A21/A26 Split Two Socket Cross/


$90^{\circ}$ Side Outlet Tee

This fitting performs the same function as either Type 21 or Type 26, but because of its unique hinge pin system, it can be added to an existing tubular assembly. Type A21/A26 fittings are supplied and priced as a kit including two casting and two taper pins, which can be assembled in either configuration.


Used for safety railing on slopes between $0^{\circ}$ and $45^{\circ}$, between the top rail and an intermediate upright which is required to remain vertical. Components are held in stock as blanks and then machined to individual requirements.

Note: When used in pairs, tee will not be handed. The set screws on one side will face inward on the stair or ramp. For an alternative to this fitting, see Type 29.

28

## Two Socket Custom Cross

Note: When used in pairs, Tee will not be handed The set screws on one side will face inward on the stair or ramp. For an alternative to this fitting, see Type 30.

| type | pipe ref. <br> A | meas. (in.) | weight before <br> machined (lb.) |
| :---: | :---: | :---: | :---: |
| $28-6$ | 6 | 6.30 | 1.81 |
| $28-7$ | 7 | 7.48 | 2.73 |
| $28-8$ | 8 | 8.50 | 3.29 |

$30^{\circ}-60^{\circ}$ Single Socket Tee


## $3030^{\circ}-45^{\circ}$ Adjustable Cross



Designed as an alternative to the Type 28 fitting, this adjustable fitting can be used for railing on staircases between the mid-rail and an intermediate upright which is required to remain vertical. It may be used at any selected angle between $30^{\circ}$ and $45^{\circ}$.


| type | pipe reference <br> A | measurements (in.) <br> D | weight (lb.) |
| :---: | :---: | :---: | :---: |
| $30-6$ | 6 | 5.75 | 1.41 |
| $30-7$ | 7 | 7.01 | 2.14 |
| $30-8$ | 8 | 8.50 | 2.87 |

## 31 Pallet Flange



This fitting has been designed for the construction of post pallets. Incorporates sockets for the upright and side pipes, and a locating bell for stacking pallets. (Special order only.)


| type | pipe reference | measurements (in.) |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 8 | $D$ | E | F |  |
|  |  | 2.99 | 5 | 4.53 | 4.41 |

35 Three Sockete Cross


Most frequently used to tie uprights with horizontal pipes in three directions, all $90^{\circ}$ to the upright. The upright passes through the fitting.


| type | pipe ref. | measurements (in.) | weight (lb.) |  |
| :---: | :---: | :---: | :---: | :---: |
| $35-4$ | 4 | 1.34 | 2.68 | 0.44 |
| $35-5$ | 5 | 1.61 | 3.23 | 0.77 |
| $35-6$ | 6 | 1.81 | 3.62 | 0.99 |
| $36-7$ | 7 | 2.36 | 4.72 | 1.70 |
| $35-8$ | 8 | 2.68 | 5.35 | 2.62 |
| $35-9$ | 9 | 3.35 | 6.61 | 4.04 |

## A35 Split Three Socket Cross



The unique hinge and pin system of this fitting enables existing structures to be easily extended without the need for dismantling. This fitting has been designed to tie an upright with horizontal pipes in three directions, all at $90^{\circ}$ to the upright. The upright passes through the fitting.


|  | pipe ref. | measurements (in.) |  |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | A | D | E | F | G |  |
| A35-8 | 8 | 3.46 | 6.93 | 2.17 | 2.36 | 3.46 |



## A45 Split Crossover


The unique hinge and pin system of this fitting enables existing structures to be easily extended without the need for dismantling. This fitting is designed to give a $90^{\circ}$ offset crossover joint. Pipe should not be joined within the fitting. Type A45 function is comparable to Type 45 fitting.


| type | pipe reference | measurements (in.) | weight (lb.) |  |
| :---: | :---: | :---: | :---: | :---: |
|  | A | $D$ | $E$ |  |
| A45-7 | 7 | 1.93 | 1.81 | 1.43 |
| A45-8 | 8 | 2.17 | 1.96 | 1.74 |



## 050 Single

## Swivel Socket



Complete combination fitting. Reducing combinations of Type C50 are available sizes 5 through 9 . See Types F50 and M50 for individual fitting specifications. See 'Swivel Fittings' at bottom of page for more information.


| type | pipe reference |  | weight (lb.) |
| :---: | :---: | :---: | :---: |
| C50-44 | 4 | $B$ | 0.33 |
| C50-55 | 5 | 5 | 1.23 |
| C50-66 | 6 | 6 | 1.41 |
| C50-77 | 7 | 7 | 1.76 |
| C50-88 | 8 | 8 | 2.01 |
| C50-99 | 9 | 9 | 2.69 |

## F50 Female Single Swivel Socket Member



One part of combination fitting C50. The Type F50 in size 4 has only one ear, while Type F50 in sizes 5 through 9 has two ears.

Note: Type F50-4 will only mate with a Type M50-4.

|  | pipe reff | measurements (in.) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | weight (b.) |  |  |  |  |  |
|  | $A$ | $D$ | $E$ | $F$ | $\varnothing$ |  |
| F50-4 | 4 | 1.42 | 0.55 | 0.43 | 0.26 | 0.15 |
| F50-5 | 5 | 2.36 | 0.98 | 0.75 | 0.39 | 0.62 |
| F50-6 | 6 | 2.36 | 0.98 | 0.75 | 0.39 | 0.75 |
| F50-7 | 7 | 2.68 | 0.98 | 0.75 | 0.39 | 0.93 |
| F50-8 | 8 | 2.99 | 0.98 | 0.75 | 0.39 | 1.15 |
| F50-9 | 9 | 3.35 | 1.02 | 0.75 | 0.39 | 1.43 |

M50 Male Single

## Swivel Socket Member

One part of combination fitting C50.
This can also be used for attaching flat panels to tubular structures.

Note: Type M50-4 will only mate with a Type F50-4.


Ø indicates diameter of bolt hole.

Types F50, M50, MH50, M51, MH51, M52, and M58 are known as swivel fittings and can be assembled as Types C50, CH50, C51, C52, and C58 or supplied as separate items. They are frequently used for bracing but can also overcome problems where joints are required at angles other than those achieved by fixed angle fittings. For economical use of pipe, when making ' $C$ ' fittings, or combination fittings, Types F50 (sizes 5-9 only) can be combined with different sizes of Types M50, MH50, M51, MH51, M52, and M58. F50-4 and M50-4 will only combine with each other. WARNING: An entire structure should not be constructed from swivel fittings, as they would not provide sufficient stability or rigidity in the structure. Types M50, MH50, M51, M52 and M58 can also be used separately to secure various types of in-fill panel. These fittings are not designed to take bending moments.


## Kee ${ }^{\circ}$

Klamp


## C51 Double



## Swivel Socket

Complete combination fitting. Type C51 is made by combining two Type F50 fittings and one Type M51. For dimensions refer to Type F50 and Type M51. See 'Swivel Fittings' on page 12 for more information.


## M51 Male Double Swivel Socket Member



One part of a Type C51 combination fitting. This fitting can also be used for attaching flat panels to tubular structures.



P51 $\begin{aligned} & \text { Modified M51-8 } \\ & \text { with Offset Slots }\end{aligned}$


Designed for the secure fitting of various types of panels and flooring to pipe structures (ie. plywood, plastic sheeting, wood planking, etc.) This fitting has two offset flanges to allow the flush attachment of panels to pipe.


## C52 Corner Swivel Socket



Complete combination fitting. Reducing combinations of Type C52 are available sizes 5 to 8 . For dimensions refer to Type F50 and Type M52. See 'Swivel Fittings' on bottom of page 12 for more information.


| type | pipe reference |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: |
| C52-555 | 5 | 5 | 5 | 2.14 |
| C52-666 | 6 | 6 | 6 | 2.47 |
| C52-777 | 7 | 7 | 7 | 2.96 |
| C52-888 | 8 | 8 | 8 | 3.42 |



Male Corner
Swivel Socket Member
One part of a Type C52 combination fitting. This can also be used for attaching flat panels to tubular structures.


## BC53 Swivel Elbow

Type BC53-8 fitting has been designed as a variable angle in-line connection, adjustable through $202^{\circ}$.


WARNING: An entire structure should not be constructed from Type BC53-8 or any other swivel fitting, as these types would not provide sufficient stability or rigidity in the structure due to the free rotation of the fitting.


## 55 Obtuse Angle Elbow



The Type 55 is an ideal fitting to use as an alternative to bending, or when a junction between a sloping pipe and an end post is required, ie. guardrail and staircases (Refer to page 41 for more information).


| type | pipe reference | measurements (in.) |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: |
| $55-6$ | 6 | $D$ | $E$ |  |
| $55-7$ | 7 | 1.81 | 4.57 | 1.12 |
| $55-8$ | 8 | 2.17 | 6.06 | 1.80 |

Acute Angle Elbow
Type 56 is an ideal fitting to use as an alternative to bending or when a junction between a sloping pipe and an end post is required, ie. guardrail and staircases (Refer to page 41 for more information).


## C58 swivel lange

A swivel fitting for attachment of angled pipe to a flat surface. For dimensions refer to Type F50 and Type M58.

WARNING: C58 is not recommended for use as a base flange to support guardrail, balustrades, or other types of structure.



## P58 Double Tab Panel with CSH



This fitting can be used for attaching flat panels to tubular structures. The drilled holes are countersunk for to suit a flat head screw and bolt fasteners.

## 59 Spigot Flange



A spigot flange which fits inside the pipe and is not secured by a set screw. Type 59 can only be used with a pipe wall thickness of $1 / 8^{\prime \prime}$ and in light, self supporting structures.

Note: No fixing holes are provided in this fitting.


8 Extra Heavy Flange
Heavy duty flange with wide base for spreading loads over a large surface area. Hole provided for countersunk flat head screw fixings only, for use on structures where the fixing required is positional only. Frequently used as a wall fixing bracket (refer to table on page 43).
WARNING: It is not recommended for use as a base flange to support guardrail or balustrades (see Type 62).


|  | pipe | measurements (in.) |  |  |  |  |  | wt (bb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | $A$ | $D$ | $E$ | $F$ | $G$ | $\varnothing$ |  |  |
| $60-5$ | 5 | 0.55 | 5.12 | 2.52 | 3.11 | 0.31 | 2.54 |  |
| $60-6$ | 6 | 0.55 | 5.51 | 2.52 | 3.39 | 0.31 | 2.54 |  |
| $60-7$ | 7 | 0.55 | 5.87 | 2.52 | 3.74 | 0.31 | 2.87 |  |
| $60-8$ | 8 | 0.55 | 6.18 | 2.52 | 4.02 | 0.31 | 3.26 |  |
| $\varnothing$ |  |  |  |  |  |  |  |  |

$\varnothing$ indicates diameter of fixing holes.

## 8) Flange



Used on structures where the fixing required is positional only. Frequently used as a wall fixing bracket (refer to table on page 43). Holes provided for countersunk flathead screw fixings
only.
WARNING: It is not recommended for use as a base flange to support guardrail or balustrades (see Type 62).


|  | pipe | measurements (in.) |  |  |  |  |  | wt (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | $A$ | $D$ | $E$ | $F$ | $G$ | $\varnothing$ |  |  |
| $61-3$ | 3 | 0.25 | 2.76 | 1.26 | 1.85 | 0.26 | 0.42 |  |
| $61-4$ | 4 | 0.25 | 3.07 | 1.54 | 2.13 | 0.26 | 0.51 |  |
| $61-5$ | 5 | 0.25 | 3.15 | 1.57 | 2.24 | 0.26 | 0.73 |  |
| $61-6$ | 6 | 0.25 | 3.54 | 1.93 | 2.52 | 0.26 | 1.10 |  |
| $61-7$ | 7 | 0.25 | 4.02 | 2.01 | 2.99 | 0.31 | 1.37 |  |
| $61-8$ | 8 | 0.25 | 4.53 | 2.32 | 3.50 | 0.31 | 1.48 |  |
| $61-9$ | 9 | 0.39 | 5.00 | 2.48 | 3.74 | 0.39 | 2.38 |  |
| $\varnothing$ indicates diameter of fixing holes. |  |  |  |  |  |  |  |  |

62 Standard Railing Flange


Ideal when a structural fixing is required for guard rail and balustrades. The holes are of sufficient diameter to insure proper fixing with either mechanical or chemical anchor. The two set screws in the vertical socket give greater side-load stability to the upright. It is recommended that the fixing holes in the flange should be in line with the applied load (refer to table on page 43).

|  | pipe | measurements (in.) |  |  |  |  |  |  | wt (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | $A$ | $D$ | $E$ | $F$ | $G$ | $H$ | $\varnothing$ |  |  |
| $62-2$ | 2 | 1.26 | 2.52 | 1.73 | 1.54 | 0.20 | 0.35 | 0.09 |  |
| $62-5$ | 5 | 2.56 | 4.57 | 3.11 | 2.99 | 0.24 | 0.43 | 1.30 |  |
| $62-6$ | 6 | 2.99 | 5.04 | 3.50 | 3.50 | 0.31 | 0.55 | 1.61 |  |
| $62-7$ | 7 | 2.99 | 5.51 | 3.54 | 4.02 | 0.43 | 0.55 | 2.87 |  |
| $62-8$ | 8 | 3.34 | 6.10 | 3.50 | 4.53 | 0.39 | 0.55 | 2.86 |  |
| $62-9$ | 9 | 4.02 | 6.50 | 5.00 | 5.00 | 0.39 | 0.71 | 3.88 |  |
| $\varnothing$ indicates diameter of fixing holes. |  |  |  |  |  |  |  |  |  |



## 64 Standard Vertical Railing Base

Designed for fixing guardrail and balustrades to walls, parapets, steps, and ramps. The upright cannot drop through the socket. Access to the top fixing hole is restricted by the position of the flange to the barrel. When selecting a hexagon head bolt or similar bolt fixing, the maximum length of the bolt including the head must not exceed 1" (refer to table on page 43).

Note: Should an upright be required to pass through the fitting, the base can be bored out to order.

| type | pipe <br> A | measurements (in.) |  |  |  |  |  |  |  | wt (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | D | E | F | G | H | J | K | $\varnothing$ |  |
| 64-6 | 6 | 3.43 | 3.74 | 0.83 | 2.64 | 2.24 | 1.77 | 1.57 | 0.55 | 1.70 |
| 64-7 | 7 | 3.31 | 4.25 | 1.18 | 2.83 | 2.56 | 2.01 | 1.38 | 0.55 | 2.47 |
| 64-8 | 8 | 3.90 | 4.76 | 0.87 | 3.50 | 2.76 | 2.20 | 0.98 | 0.55 | 3.40 |
| Ø indicates diameter of fixing holes. |  |  |  |  |  |  |  |  |  |  |

## 65 Standard Horizontal <br> Railing Base



This fitting is designed for palm fixing guard railing and balustrades to walls, parapets, steps, and ramps. The upright cannot drop through the socket (refer to table on page 43).

Note: Should an upright be required to pass through the fitting, the base can be bored out to order.


## 66 Ground Socket



## 67 Angle flange



Type 67 has been designed to allow the upright to pivot in the barrel, providing an angular displacement from $3^{\circ}$ up to a maximum of $11^{\circ}$, measured from the vertical. Ideal to secure balustrade and guardrail systems on access ramps or other types of slopes (refer to table on page 43).

Note: It is generally recommended that when installing the 67-8 that the fixing holes in the base should be in line with the applied load.


## 68 Wall Flange



Side fixing for guardrail and balustrades to walls, parapets, steps, and ramps. The upright cannot drop through the socket (refer to table on page 43).


Note: If the upright is required to pass through the fitting by machining out the base stop, the bottom fixing hole will be unusable.

| type | $\begin{gathered} \text { pipe } \\ \text { A } \end{gathered}$ | measurements (in.) |  |  |  |  |  |  |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | D | E | F | G | H | J | K | L | $\varnothing$ |  |
| 68-6 | 6 | 2.48 | 1.77 | 3.03 | 2.80 | 0.94 | 3.75 | 4.06 | 1.00 | 0.43 | 1.37 |
| 68-9 | 7 | 2.83 | 2.09 | 3.27 | 3.27 | 1.10 | 4.19 | 4.25 | 1.00 | 0.43 | 1.76 |
| 68-8 | 8 | 3.07 | 2.36 | 3.50 | 3.39 | 1.22 | 4.44 | 4.56 | 1.00 | 0.43 | 2.09 |

## 69 Railing Flange with Toe Board Adaptor



Designed for guardrail and balustrade applications with the added benefit of attaching a toe board to the base. The base plate holes are sufficient diameter to allow for attachment with either a mechanical or chemical anchor. The side plates have slotted holes to allow for a degree of sideways movement for ease of installation. (See page 36 for Toe Board).


| type | $L$ | $M$ | $N$ | $P$ | $R$ | $\varnothing$ | weight (b.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $69-6$ | 3.94 | 1.38 | 0.28 | 1.77 | 1.00 | 0.43 | 3.79 |
| $69-7$ | 4.53 | 1.57 | 0.28 | 1.85 | 1.00 | 0.43 | 4.32 |
| $69-8$ | 5.12 | 1.97 | 0.28 | 2.13 | 1.00 | 0.43 | 5.07 |
| $\varnothing$ | indicates diameter of fixing holes. |  |  |  |  |  |  |

## 70 Rail Support

Designed to carry handrails along walls or to fix structures back to walls. The pipe passes through the fitting and cannot be joined with the fitting. Type 70 is also used to attach toe boards to the base of guardrail uprights. Holes provided for countersunk flat head screw fixings only.

WARNING: Type 70 fittings are not designed to be used as base flanges for full height guardrails or handrails.

|  | pipe ref. | measurements (in.) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | A | $D$ | $E$ | $F$ | $G$ | $\varnothing$ | wt. (lb.) |
| $70-5$ | 5 | 2.17 | 3.07 | 1.81 | 2.24 | 0.31 | 0.79 |
| $70-6$ | 6 | 2.28 | 3.46 | 1.57 | 2.76 | 0.31 | 0.97 |
| $70-7$ | 7 | 2.52 | 4.02 | 1.81 | 3.23 | 0.31 | 1.23 |
| $70-8$ | 8 | 2.76 | 4.25 | 2.05 | 3.23 | 0.31 | 1.72 |
| $\varnothing$ indicates diameter of fixing holes. |  |  |  |  |  |  |  |



## 75 collar

fitting if the latter is required to be left untightened, such as gate hinges. Type 75 is also useful when the loading on a structure exceeds the maximum permitted slip load for a set screw, as it gives it additional support.

| type | pipe reference | measurements (in.) | weight (lb.) |
| :---: | :---: | :---: | :---: |
| $75-4$ | 4 | 0.91 | 0.11 |
| $75-5$ | 5 | 1.02 | 0.29 |
| $75-6$ | 6 | 1.02 | 0.29 |
| $75-7$ | 7 | 1.02 | 0.33 |
| $75-8$ | 8 | 1.02 | 0.42 |

## 76 Hook



## 77 Plastic Plug



## 78 Eye Fitting



Used in conjunction with Type 83 fitting for gate hinges.


| type | pipe reference | measurements (in.) |  | weight (lb.) |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $78-5$ | 5 | 1.18 | 1.02 | 0.46 | 0.46 |
| $78-6$ | 6 | 1.30 | 1.02 | 0.55 | 0.55 |
| $78-7$ | 7 | 1.50 | 1.02 | 0.57 | 0.57 |
| $78-8$ | 8 | 1.61 | 1.02 | 0.62 | 0.62 |
| $\varnothing$ indicates diameter of pivot hole. |  |  |  |  |  |
|  |  |  |  |  |  |

## 79 Sheeting Clip



This fitting is used to attach profiled sheeting material to pipe. The fitting is supplied with the following hardware: one $\mathrm{M} 6 \times 50 \mathrm{~mm}$ roofing bolt, on M6 square nut, and one M6 lock washer. BZP finish.


81 Single Sided Clip


For attaching wire mesh in-fill. For economy it is possible to use Type 81 clips without the safety attachment to secure various types of in-fill panels (ply-board, PERSPEX, etc. ) up to a thickness of $25 / 64$ ". All clips are supplied with hexagonal head fixing bolts, M6x35mm long and nut. The primary clip has a slot measuring $0.31 \times 0.59$ inches.


Note: For $D$ and $E$ dimensions the figures are given for the respective minimum and maximum dimensions allowed by the slotted hole.

| type | pipe ref | measurements (in.) |  |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | D | E | $F$ | $\varnothing$ |  |
| 81-5 | 5 | 0.94 | 1.77 | 2.20 | 0.28 | 0.15 |
| 81-6 | 6 | 1.06 | 2.05 | 2.32 | 0.28 | 0.18 |
| 81-7 | 7 | 1.26 | 2.24 | 2.52 | 0.28 | 0.18 |
| 81-8 | 8 | 1.34 | 2.32 | 2.60 | 0.28 | 0.20 |
| 81-9 | 9 | 1.57 | 2.56 | 2.83 | 0.28 | 0.22 |

$\varnothing$ indicates diameter of the safety attachment bolt hole.

82 Double Sided Clip


For attaching wire-mesh in-fill. For economy it is possible to use Type 82 clips without the safety attachment, to secure various types of in-fill panels (ply-board, PERSPEX, etc.) up to a thickness of 25/64". All clips are supplied with hexagonal head fixing bolts, M6x35mm long, and nut. The primary clip has a slot measuring $8 \mathrm{~mm} \times 15 \mathrm{~mm}$.

Note: For $D$ and $E$ dimensions the figures are given for the respective minimum and maximum dimensions allowed by the slotted hole.

|  | pipe ref. | measurements (in.) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | weight (lb.) |  |  |  |  |  |
|  | $A$ | $D$ | $E$ | $F$ | $\varnothing$ |  |
| $82-5$ | 5 | 0.94 | 1.77 | 4.41 | 0.28 | 0.24 |
| $82-6$ | 6 | 1.06 | 2.05 | 4.65 | 0.28 | 0.26 |
| $82-7$ | 7 | 1.26 | 2.24 | 5.04 | 0.28 | 0.29 |
| $82-8$ | 8 | 1.34 | 2.32 | 5.20 | 0.28 | 0.31 |
| $82-9$ | 9 | 1.57 | 2.56 | 5.67 | 0.28 | 0.31 |

$\varnothing$ indicates diameter of the safety attachment bolt hole.

## 83 Pin Fitting



## 84

## Malleable Plug

A metal drive-in plug which is difficult
 to remove when installed. For an alternative in plastic, see Type 77.

Note: This fitting can only be used with Schedule 40 steel pipe.


| type | pipe reference | weight (lb.) |
| :---: | :---: | :---: |
| $84-5$ | 5 | 0.11 |
| $84-6$ | 6 | 0.22 |
| $84-7$ | 7 | 0.26 |
| $84-8$ | 8 | 0.37 |
| $84-9$ | 9 | 0.64 |

## 87 Angle Elbow



Used to join the top rail to an end upright on a guardrail on a slope from $0^{\circ}$ to $11^{\circ}$. Pipe cannot be joined within this fitting.


## 88 Three Socket Angle Tee



Used to join the top rail to an intermediate upright on a guardrail on a slope from $0^{\circ}$ to $11^{\circ}$. As there are two socket set screws in the sleeve, this fitting can be used to join two ends of rail.


| type | pipe reference | measurements (in.) | weight (lb.) |  |
| :---: | :---: | :---: | :---: | :---: |
| $88-7$ | 7 | 2.36 | 5.67 | 2.16 |
| $88-8$ | 8 | 2.68 | 6.22 | 2.73 |

## The Slope Range (86-89)

The slope range of fittings consists of fitting Types $86,87,88,89$. These fittings are designed to facilitate in-line railings with vertical posts on slopes with angles between 0 and 11. They can be used to construct railings on access ramps for people with disabilities when used in conjunction with the KEE LITE Type L160 fitting.


## 90 PGR Three Socket Tee



## 91 PGR Two Socket Cross



## The PGR Range ( 90 to 95)

These are known as Pedestrian Guardrail (PGR) fittings and are used as an alternative to Types $10,15,25$, and 26 when the site is not straight and level. There is sufficient play within the fitting to negotiate a slope up to 7 feet or a radius greater than 20 feet, when the uprights are at 6-1/2 foot centers, using straight pipe. They also allow damaged rails to be removed without dismantling the adjacent structure. The 90 to 95 range of fittings is available in size 8. Special order only.

## 92 pgrebow



93 pgr tee


## 95 PGR Internal Spigot

Internal spigot designed to prevent sagging of bends when using the 90 to 95 range of fittings. (Special order only).


## 97 Set Screws



Socket set screws are supplied in all KEE KLAMP fittings as standard. KEE KOAT, applied as standard throughout the KEE KLAMP range, provides the set screws with up to four times the corrosion resistance of Bright Zinc Plating.

| type | to suit pipe sizes | description |  |
| :---: | :---: | :---: | :---: |
| $97-2$ | 2 | 3 | $5 / 16$ " BSF |
| $97-4$ | 4 |  | $3 / 8^{\prime \prime}$ BSF |
| $97-6$ | 5 | 6 |  |
| $97-7$ | 7 | 8 | 9 |

100 Plastic Set Screw Cap


## 105 Sheeting Clip without <br> Hardware

This clip is used to attach profiled or flat sheeting. Not supplied with hardware.

Note: For use where fixing required is positional only. Clip is not intended to bear substantial load.


| type | pipe | measurements (in.) |  |  |  |  |  | wt (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $A$ | $D$ | $E$ | $F$ | $G$ | $\varnothing$ |  |  |
| $105-6$ | 6 | 1.26 | 1.57 | 0.51 | 1.97 | 0.35 | 0.31 |  |
| $105-7$ | 7 | 1.50 | 1.57 | 0.51 | 1.97 | 0.35 | 0.35 |  |
| $105-8$ | 8 | 1.57 | 1.57 | 0.51 | 1.97 | 0.35 | 0.40 |  |
| $105-9$ | 9 | 1.89 | 1.57 | 0.51 | 1.97 | 0.35 | 0.51 |  |
| $\varnothing$ indicates diameter of bolt hole. |  |  |  |  |  |  |  |  |

 hardware.

## 114 Swivel Tee



## 115 Wall Flange



Type 115 is designed for palm fixing of guard rail and balustrades to walls, parapets, steps, and ramps. The upright cannot drop through the socket. Packer plates, Type S115, are available to allow the fitting to be positioned in channels, slots, and other offset areas.


|  | pipe |  |  |  |  |  |  |  | measurements (in.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | $A$ | $D$ | $E$ | $F$ | $G$ | $H$ | $J$ | $\varnothing$ | wt (lb.) |
| $115-6$ | 6 | 5.91 | 3.94 | 1.18 | 3.54 | 2.56 | 0.39 | 0.55 | 2.34 |
| $115-7$ | 7 | 5.91 | 3.94 | 1.38 | 3.54 | 2.56 | 0.39 | 0.55 | 2.71 |
| $115-8$ | 8 | 5.91 | 3.94 | 1.61 | 3.54 | 2.56 | 0.39 | 0.55 | 3.13 |




## 121 Corner Crossover



## 126 Galvanized Clip

Used to attach shelving and panels to pipe. Curved edge rests under pipe while screw or bolt holds panel
 in place.

| type | pipe reference | measurements (in.) <br> $\varnothing$ | weight (lb.) |
| :---: | :---: | :---: | :---: |
| $126-4$ | 4 | 0.33 | 0.03 |
| $126-5$ | 5 | 0.33 | 0.05 |
| $126-6$ | 6 | 0.38 | 0.09 |
| $126-7$ | 7 | 0.50 | 0.12 |
| $126-8$ | 8 | 0.50 | 0.16 |
| $126-9$ | 9 | 0.50 | 0.25 |



## 316 Parapet Flange

A component designed to retrofit
 roof parapets that are an unsafe height. Rail anchor is angled 25 degrees from the vertical so that the building's visage is unaffected by the implemented railing. Two holes are located in the top mounting bracket for mounting directly into the parapet. The two set screws in the vertical socket give greater side-load stability to the angled upright. Engineered weep hole allows water to drain.


| type | pipe ref. | measurements (in.) |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | A | $D$ | $E$ | $\varnothing$ |  |
| $316-7$ | 7 | 5.35 | 4.25 | .55 | 4.21 |
| $316-8$ | 8 | 5.42 | 4.25 | .55 | 4.52 |
| $\varnothing$ indicates diameter of fixing hole. |  |  |  |  |  |



## Kee Lite ${ }^{\text {® }}$ <br> Aluminum Safety Components



KEE LITE components are made from a high grade Aluminum Silicon Magnesium Alloy and provide you with a lightweight, corrosion resistant, and strong alternative for fabrication of pipe structures. The components offer flexibility and can be used for a variety of applications from contemporary to industrial; your imagination is the only limitation.

Because KEE LITE can be easily installed with a hex tool and pipe cutters, there is no need for welding, saving you both time and money. KEE LITE is securely locked into place using recessed set screws that provide a sleek and smooth look to your railing system or pipe structure.

## Engineering

KEE LITE offers lightweight and versatile safety solutions. When KEE LITE fittings in sizes 7, 8, 9 are used to construct 42" high guard railing, the railing will meet the requirements of the OSHA design standard of a single 200 lb . load applied at any location along the top rail when the correct specification of pipe is used, and the correct method of design is employed. The integrity of the structure to which the system is secured, and the hardware used will also need to be checked to ensure they are capable of meeting the imposed load requirements (reference OSHA 29 CFR 1910.23). Please contact Safety Rail Source for design assistance.

## Fittings by Function

## Bases

L62........Standard Railing
L69.........Railing Flange
L148.......Heavy Duty Rectangular
L150...... Heavy Duty Four Hole Sq. L152.......Four Hole Square
Couplings
L14.........Straight

## Crosses

L26.........Two Socket L30......... $30^{\circ}-45^{\circ}$ Adjustable L35.........Three Socket

## Crossovers

L45.........Crossover
L46.........Combination Socket Tee

## Elbows

L15.........90 ${ }^{\circ}$
L20..........Side Outlet
LB54.......Adjustable
Flanges
LC58.......Swivel
LM58......Male Wall Plate
L61..........Round
L68..........Wall
L164......Offset Wall

Handrail Wall Bracket
L70........Rail Support
L160......Smooth Handrail Fitting
L164........Offset Wall
475........Aluminum Wall Bracket

## Plugs

77..........Plastic

L84.........Aluminum

## Swivel Sockets

LC50......Single Combination
LF50.......Female Single
LM50.......Male Single
LC51......Double Combination
LM51......Male Double
LC52.......Corner Combination
LM52........Male Corner

## Tees

L10........Single Socket
L29........30․ $60^{\circ}$ Single Socket
L25........Three Socket
L19.........Adjustable Side Outlet
L21........ $90^{\circ}$ Side Outlet
L114......Swive|
L46........Comb. Socket Crossover
Toe Board Kits
T9901....Aluminum Toe Board
T9902....Upright Hardware Kit

T9903....Straight Splice Kit
T9904....Corner Splice Kit

## Miscellaneous

97-S........Stainless Steel Set Screws Gaskets...Neoprene Flange Gaskets
Designed to give a $90^{\circ}$ butt joint between two pipes. Frequently used for the joint between end uprights and the middle rail where the railing site is straight and level. Also used for base ties on racking. This fitting cannot be used where the pipe through sleeve ' $A$ ' is required to be joined within the fitting.

|  |  | type | pipe ref. <br> A | measurements (in.) |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (0) |  |  |  |  |  |  |  |
|  |  | L10-6 | 6 | 2.05 | 1.67 | 2.20 | 0.29 |
|  |  | L10-7 | 7 | 2.56 | 2.09 | 2.52 | 0.44 |
| $\bullet F-$ | $E$ - | L10-8 | 8 | 2.91 | 2.36 | 2.76 | 0.66 |
|  |  | L10-9 | 9 | 3.54 | 2.91 | 3.23 | 1.06 |



## L2O side outuet Eliow



A $90^{\circ}$ corner joint most frequently used for the top rail of safety railing. It can also be used for the corner joint of benches, work tables, and other rectangular structures.

between pipes of the same size. Frequently used to enable full pipe lengths to be used in railing applications.

Note: It is not advisable to join the upper and lower rails of a railing within the same bay.


L15 90탸ow



## L26 Two Socket Cross



Usually paired with type L25 to give a $90^{\circ}$ joint between the middle rail and an intermediate upright on safety railing. The upright passes through the fitting.

| - | L26-6 | 6 | 1.67 | 2.20 | 4.09 | 0.37 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $F$ | L26-7 | 7 | 2.09 | 2.52 | 5.12 | 0.62 |
| $\mathbb{\square}$ | L26-8 | 8 | 2.36 | 2.76 | 5.83 | 0.99 |
| E | L26-9 | 9 | 2.91 | 3.23 | 7.09 | 1.46 |


$30^{\circ}-45^{\circ}$ Adjustable Cross


This adjustable fitting can be used for railing on staircases between the midrail and intermediate upright which is required to remain vertical. It can be used at any selected angle between $30^{\circ}$ and $45^{\circ}$.


## L35 Three Socket Cross

Most frequently used to tie uprights with horizontal pipe in three directions, all $90^{\circ}$ to the upright. The upright passes through the fitting.


|  | pipe ref. | measurements (in.) |  |  |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | A | $D$ | $E$ | $F$ | $G$ |  |
| L35-6 | 6 | 2.20 | 4.09 | 2.05 | 1.67 | 0.68 |



## L45 Crossover



Designed to give a $90^{\circ}$ offset crossover joint. Frequently used on safety railing utilizing a continuous horizontal rail, minimizing pipe cuts to reduce costs. Type L45 may also be used to allow intermediate levels on racks.

Note: Pipe cannot be joined with this fitting.


Single Swivel Socket
A complete combination swivel fitting, variable through $170^{\circ}$. See Type LM50 and Type LF50 for measurements.


## LF50 Female Singe Swivel <br> \section*{Socket Member}



## Swivel Fittings

Types LF50, LM50, LM51, LM52, and LM58 are known as swivel fittings and can be assembled as Types LC50, LC51, LC52, and LC58 or supplied as separate items. They are frequently used for bracing but can also overcome problems where joints are required at angles other than those achieved by fixed angle fittings. When making 'C' fittings, or combination fittings, Types LF50 can be combined with different sizes of Type ' M ' fittings, or male components. WARNING: An entire structure should not be constructed from swivel fittings, as they would not provide sufficient stability or rigidity in the structure. Types LM50, LM51, LM52 and LM58 can also be used separately to secure various types of in-fill panel. These fittings are not designed to take bending moments.


## LB54 <br> Adjustable Elbow

A swivel fitting designed as an in-line variable angle connection, adjustable from $45^{\circ}$ to $200^{\circ}$. Nut and bolt included.


## LM52 Male Corner Swivel Socket Member



One half of a combination component. This component can also be used for attaching flat panels to tubular structures.


|  | pipe ref. | measurements (in.) |  |  |  |  |  | wt. (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $A$ | $D$ | $E$ | $F$ | $G$ | $H$ | $\varnothing$ |  |
|  | 6 | 1.97 | 1.73 | 1.85 | 0.43 | 1.67 | 0.38 | 0.35 |
|  | 7 | 2.32 | 2.00 | 1.97 | 0.43 | 2.09 | 0.38 | 0.51 |
|  | 8 | 2.56 | 2.36 | 2.17 | 0.43 | 2.36 | 0.38 | 0.60 |

$\varnothing$ indicates diameter of rivet holes.

## LC58 Swivel Flange

A swivel fitting for attachment of angled pipe to a flat surface. See Type LM58 and Type LF50 for measurements.


Note: This fitting is not recommended for use as a base flange to support guardrail or balustrades.


| type | pipe reference | measurements (in.) <br> A | weight (lb.) |
| :---: | :---: | :---: | :---: |
| LC58-6 | 6 | 0.45 | 0.74 |
| LC58-7 | 7 | 0.45 | 1.93 |
| LC58-8 | 8 | 0.45 | 1.46 |
| $\varnothing$ indicates diameter of fixing holes. |  |  |  |

## LM58 Male Wall Plate

The male part of a swivel fitting for attaching angled tubing to flat surfaces.



Flange
This flange, with holes provided for countersunk head fixing screws only, is used in structures where the fixing required is positional only. Frequently used as a wall fixing bracket.

Note: L61 is not recommended for use as a base flange to support guard rail or balustrades. Use Type L152 flange if a base flange is needed.

|  | type | pipe ref. <br> A | measurements (in.) |  |  |  |  |  | wt. (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | D | E | $F$ | G | H | $\emptyset$ |  |
|  | L61-6 | 6 | 1.67 | 1.97 | 0.31 | 3.94 | 1.93 | 0.25 | 0.46 |
|  | L61-7 | 7 | 2.09 | 2.17 | 0.31 | 4.33 | 2.40 | 0.25 | 0.64 |
| - D- | L61-8 | 8 | 2.36 | 2.36 | 0.31 | 4.72 | 2.64 | 0.25 | 0.71 |
|  | $\varnothing$ indicates diameter of fixing holes. |  |  |  |  |  |  |  |  |

## L62 Standard Railing Flange



The Type L62 flange should always be used to fix down guardrail and balustrades. Holes are of sufficient diameter to give a good fixing with either a mechanical or chemical anchor. Two set screws in the vertical socket give greater stability to the upright. It is recommended that the fixing holes in the flange be in-line with the applied load. The pipe is able to pass through the base of the fitting.


|  | pipe | measurements (in.) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | A | $D$ | $E$ | $F$ | $G$ | $H$ | I | J | $\varnothing$ | (lb.) |
| L70-6 | 6 | 2.36 | 3.62 | 1.97 | 1.97 | 1.77 | 2.68 | 0.39 | 0.31 | 0.44 |
| L70-7 | 7 | 2.68 | 4.13 | 2.32 | 2.36 | 2.13 | 3.19 | 0.39 | 0.31 | 0.75 |
| L70-8 | 8 | 2.95 | 4.53 | 2.56 | 2.60 | 2.36 | 3.58 | 0.39 | 0.31 | 0.99 |

$\varnothing$ indicates diameter of fixing holes.

## $\llcorner 69$ Railing Flange with Toe Board Adapter



The L69 railing flange has been designed for guard rail and balustrades and allows attachment of a toe board to the base. The base plate holes are of sufficient diameter to allow for attachment with either a mechanical or chemical anchor, the side plates have slotted holes to allow for a degree of sideways movement for ease of installation. A toe board designed for used with Type L69 railing flange is available from KEE SAFETY. (See page 36.)


| type | pipe ref. <br> A | D | E | F | G | H | measurements (in.) |  |  |  | M | N | $\bigcirc$ | P | $\varnothing$ | weight ( l .) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  | 1 | J | K | L |  |  |  |  |  |  |
| L69-7 | 7 | 0.39 | 0.59 | 5.71 | 3.15 | 3.15 | 3.78 | 2.28 | 0.79 | 0.45 | 4.53 | 1.57 | 0.31 | 2.16 | 0.45 | 1.41 |
| L69-8 | 8 | 0.39 | 0.59 | 6.30 | 3.54 | 3.15 | 4.41 | 2.28 | 0.79 | 0.45 | 5.12 | 1.97 | 0.31 | 2.24 | 0.45 | 1.65 |


$\varnothing$ indicates diameter of fixing holes.
L84 Aluminum Plug
A metal drive-in plug. For proper insertion, a rubber mallet should be used.

The metal plug is difficult to remove once installed.

|  |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |



| type | pipe <br> A | measurements (in.) |  |  |  |  |  |  |  |  | wt (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | D | E | F | G | H | $I$ | J | K | $\varnothing$ |  |
| L148-9/2 | 9 | 1.97 | 3.54 | 0.35 | 3.50 | 5.04 | - | - | 2.95 | 0.55 | 0.77 |
| L148-9/4 | 9 | 2.18 | 3.54 | 0.35 | 4.02 | 5.51 | - | - | 3.23 | 0.55 | 0.94 |

$\varnothing$ indicates diameter of fixing holes.


## L152 4 Hole Square Flange

A four point fixing base or wall flange.


| type | pipe ref. <br> A | measurements (in.) |  |  |  |  |  | wt (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | D | E | F | G | H | Ø |  |
| L152-6 | 6 | 1.97 | 1.81 | 0.25 | 2.99 | 2.06 | 0.31 | 0.35 |
| L152-7 | 7 | 2.32 | 2.17 | 0.31 | 3.35 | 2.38 | 0.45 | 0.59 |
| L152-8 | 8 | 2.56 | 2.56 | 0.31 | 3.62 |  | 0.45 | 0.68 |
| $\varnothing$ indicates diameter of fixing holes. |  |  |  |  |  |  |  |  |

## L160 smooth Handrail Fitting



## Neoprene Gaskets

Gaskets are available to prevent the corrosion associated with lime in concrete. The gaskets have more resistance than natural rubber to sunlight, ozone, and oxidation. Neoprene is heat resistant and does not soften as natural rubber does under severe exposure. Gasket part numbers correspond to KEE LITE flange and base components as follows:

| LG58 |  |  |  |  | LG70-6 |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  | LG61-7 | LG62-7 | LG68-7 | LG69-7 | LG70-7 |  | LG152-7 |  |
|  | LG61-8 | LG62-8 | LG68-8 | LG69-8 | LG70-8 | LG150-8 | LG152-8 | LG164-8 |

## 475 Aluminum Wall Bracket

Designed to provide attachment for a
 smooth handrail which complies with the Americans with Disabilities Act of 1990. Three fixing holes are drilled and countersunk to suit $1 / 4 \mathrm{in}$. diameter flat head wood screws. Designed for use with size 7 pipe.


## Offset Wall Flange



This component is designed for palm fixing of uprights to steel channels, walls, parapets, steps, and ramps. The upright cannot drop through the socket.

|  |  | measurements (in.) |  |  |  |  | pipe | wall |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| type | pipe | (lb.) |  |  |  |  |  |  |
|  |  | D | $E$ | $F$ | $G$ | $\varnothing$ | $\varnothing$ |  |
| $475-40$ | 7 | 3.5 | 0.25 | 3.15 | 3.27 | .20 | .27 | 0.57 |
|  | $\varnothing$ indicates diameter of fixing holes in inches. |  |  |  |  |  |  |  |




## ADA Components

Safety Rail Source has developed the KEE ACCESS Railing System specifically to equip architects, engineers, specifiers, builders, and contractors with the components nec- essary to easily construct and retrofit commercial and public structures to satisfy the requirements of the Americans with Disabilities Act (ADA), as well as state and local building codes. KEE ACCESS components were designed for constructing of smooth handrail gripping surfaces using standard 1-1/4" schedule 40 pipe. The KEE ACCESS Railing System is a cost effective ADA handrail solution suitable for stairs, ramps, or walkways. An ADA handrail is a framework of horizontal rails supported by vertical uprights, or posts.

## Engineering

The modular KEE ACCESS components securely join standard sizes of schedule 40 galvanized steel pipe. Any KEE ACCESS Railing System can be easily installed with a hex tool and pipe cutters, and therefore easily assembled without specialized workers or equipment, saving you both time and money. Components, including schedule 40 pipe, are galvanized, for low long-term maintenance and can be powder coated to your choice of RAL Colors.

Safety Rail Source has a solution for every environment and situation. KEE KLAMP components can be implemented alongside KEE ACCESS components to create a complete line of complementary galvanized components. Send us your drawings, sketches, or layout for a complete detailed proposal.

Fittings by Function
Coupling
514-7.....Internal

## Elbows

515-7.....90 Split
520-7.....90 ${ }^{\circ}$ Solid
554-7.....Variable Angle
565-7.....Wall Mounted End Return
567-7.....End Post Handrail Return
Bases + Flanges
561-7.....Wall
565-7.....Wall Mounted End Return
Handrail Wall Bracket
475-40 ...Aluminum Mounted
518-7......Galvanized Inset
570-7.....Galvanized Mounted
Tees/Sockets
A10-748. Add-on Single Handrail 1-1/4"
10-840C. Single Handrail Capped
10-848...Single Handrail
A10-848..Add-on Split Single Handrail 1-1/2"
26-840 ...Twin Handrail 26-840C. Twin Handrail Capped 555-8.....Top Fix Rail Assembly
Miscellaneous
84-848...Upright Top Cap
508-7......Gap Washer

## KEE ACCESS Basic Assembly

How these components work together to give you the most durable and flexible ADA compliant railing system available.



## 10-848 Single Handrail Socket



## Add-on Single Handrail

 SocketThe unique "hinge and pin" system of this socket tee enables existing structures to be easily modified without the need for dismantling. Hinges around existing size 8 , or 1-1/2" pipe.


A10848


## 26-840 Twin Handrail Socket

A
Fitting slips over upright to create to handrail sockets at $90^{\circ}$ joints.


## 26-840C Twin Handrail Socket Capped

Capped fitting for use at the termination of an upright to create two handrail sockets at $90^{\circ}$ joints from the upright.


A


## 84848 <br> Upright Top Cap

A metal drive-in plug which is difficult to remove when installed. The $84-848$ is a


A cap for the open ends of size 8 uprights and covers the top of a 10-848 tee fitting. KEE KLAMP Types 77-7, 77-8, 84-7, or $84-8$ could also be used, but do only cap the pipe, not the pipe as well as the component. This fitting can only be used with Schedule 40 steel pipe.

## 475 Aluminum Wall Bracket

Designed to provide attachment for a smooth handrail which complies with the Americans with Disabilities Act of 1990. Three fixing holes are drilled and countersunk to suit $1 / 4$ in. diameter flat head wood screws. Designed for use with size 7 pipe.


## 508-7 Optional Gap Washer

A rubber gasket for use with size 7 com-
ponents. Comes only in black.

## $514-7$ internal Coupling

Designed especially for ADA railing, this internal coupling can be powder coated unlike our Type 18 fitting. The inset hex screw and precise coupling design allows
 handrail to be smooth and continuous. This coupling serves as an intermediate handrail support. The internal coupling is a necessary component when installing Type 520-7, Type 554-7, Type 565-7, and Type 567-7.


| type | pipe ref. | measurements (in.) |  | weight (lb.) |
| :---: | :---: | :---: | :---: | :---: |
|  | A | D | E |  |
| $514-7$ | 7 | 2.93 | 1.00 | .84 |

## 515-7 90․ Spite Ebow

A $90^{\circ}$ corner elbow consisting of two separate pieces, 515-7T and 515-7B, which are joined by a centrally positioned screw. The combined fitting is positioned with the ends inside the adjoining handrails, and the outer grub-screws tightened. This forces the halves apart, gripping the inside of the tube. The central is then tightened, locking the fitting in place.


## 5 - Handrail Bracket

An intermediate upright handrail support. This bracket is designed to be mounted on a Type 10-848 or a Type A10 fitting; the rail sits on the saddle and is secured by either $\varnothing 4.8 \mathrm{~mm} \times 15 \mathrm{~mm}$ long aluminum 'multi-grip' pop rivets or No. 10 x $B 20 \mathrm{~mm}$ countersunk self-tapping screws.


| type | pipe ref. |  | measurements (in.) |  |  | wt. (lb.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | A | $B$ | $D$ | $E$ | $\varnothing$ |  |
| $518-7$ | 7 | socket | 2.01 | 1.18 | .20 | 1.08 |

$\varnothing$ indicates diameter of rivet holes.

## 520-7 90 Solid Ebow

An alternative elbow to Type 515, a two piece fitting. The elbow is designed to
 be joined to the handrails using two Type 514-7 internal couplings.

## $554-7$ Variable Angle

A variable angle elbow for changes in elevation. This elbow allow for flexibility

A

| type | pipe ref. |  |  |
| :---: | :---: | :---: | :---: |
| A | measurements (in.) <br> D | weight (lb.) |  |
| $554-7$ | $514-7$ | 4.27 | .73 | elbow is joined to rails using two Type 514-7 internal couplings.



## Wall Mounted End Return

A wall mounted handrail return bracket. Bracket is joined to handrail using Type 514-7 coupling. Three fixing holes are drilled and countersunk to suit $1 / 4 \mathrm{in}$. diameter flat head wood screws.


| type | pipe ref. <br> A | measurements (in.) |  |  |  | weight ( lb .) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | D | E | $F$ | $\varnothing$ |  |
| 565-7 | 514-7 | 3.32 | 3.39 | 3.54 | . 27 | 1.48 |
| $\varnothing$ indicates diameter of fixing holes. |  |  |  |  |  |  |



561-7 Wall Mounted End Return
A wall mounted hand rail end flange.


Four fixing holes are drilled and countersunk to suit $1 / 4 \mathrm{in}$. diameter flat head wood screws.


567-7 End Post Handrail Return
A handrail return bracket for use when mounting railing to an upright. This handrail is mounted to an upright using a handrail socket. Join the return handrail using Type 514-7 internal coupling.


## Wall Mounted Handrail Bracket

A wall mounted version of the 518-7. The handrail tube sits on the 'saddle' and is secured using either No. 12 selfdrilling screws or multi-grip pop rivets. This bracket provides holes for countersunk head fixing screws only. Three fixing holes are drilled and countersunk to suit 1/4 in. diameter flat head wood screws.



## accessories



## 5 Fold up Hex Key Set

A rugged set in a handy fold up pocket



A/F refers to the dimension across the flats.

## 98 Ratchet



Ratchet tool complete with 2 hexagonal bits, one $1 / 4$ " and one $5 / 16$ ". Handle is 10 " long and has a $1 / 2^{\prime \prime}$ drive. Benefits: easier to fasten set screws and improved design.


| type | to suit pipe sizes |  |  | A/F |
| :---: | :---: | :---: | :---: | :---: |
| 98 | 4 | 5 | 6 | $1 / 4^{\prime \prime}$ |
|  | 7 | 8 | 9 | $5 / 16^{\prime \prime}$ |

A/F refers to the dimension across the flats.

A/F refers to the dimension across the flats.

## 99 Hex Key


Simple hex key. A/F refers to the dimension across the flats.

| type | to suit pipe sizes | A/F |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $99-2$ | 2 | 3 | $5 / 32^{\prime \prime}$ |  |
| $99-4$ | 4 |  | $3 / 16^{\prime \prime}$ |  |
| $99-6$ | 5 | 6 |  | $1 / 4^{\prime \prime}$ |
| $99-7$ | 7 | 8 | 9 | $5 / 16^{\prime \prime}$ |

## Toe Board

Used with fitting type L69 Railing Flange, the option meets OSHA requirements for toe boards. The toe board is 4 " high and is made of aluminum. A channel in the toe board accepts the bolt head of the mounting hardware allowing ease in placement. Toe board is sold by the linear foot. Mounting hardware available separately. Toe board comes in 24 ' lengths or custom cut.

| type | description |
| :---: | :---: |
| T9901 | Aluminum Toe Board <br> (4" Wide up to 24' in length) |
| T9902 | Upright Hardware Kit |
| T9903 | Straight Splice Kit |
| T9904 | Corner Splice Kit |
| T9905 | U-Bracket Kit |

## LSG safety Spring Gate

Our safety gate has spring hinges and $180^{\circ}$ rotation. Installs with simple hand tools to existing uprights. All mounting hardware is included. Available in Hot Dipped Galvanized steel. May be powder coated. All gates have adjustable opening widths minus (-) 1-1/4" and plus (+) 1-1/2" from opening width below..

| type | gate to suit opening width of |
| :---: | :---: |
| LSG-18-GALV | $18^{\prime \prime}$ |
| LSG-24-GALV | $24^{\prime \prime}$ |
| LSG-30-GALV | $30^{\prime \prime}$ |
| LSG-36-GALV | $36^{\prime \prime}$ |



## In-fill Panels

Panels in a variety of materials, sizes, and finishes. The standard $4 " \times 4$ " is available in sizes up to 4' wide by 8' long. Smaller openings available (2" x 2 " or 1 " x $1^{\prime \prime}$ ). Material can be provided with a galvanized or powder coat finish, or in bare stainless steel. Virtually any custom configuration is available.

## 97ATD Ani:Thet Device

Aluminum drive rivets deter tampering with set screws as well as create a finished, aesthetic look. Drive rivets are easy to
 install, requiring no special tools. The drive rivet is set by striking the pin with a hammer, driving the pin flush with the rivet head and expanding the back side of the rivet. One size fits components 5-9. Rivets for components 2-4 available upon request.


## Hi-Traction Covers

Improve footing and help prevent slips and falls. A variety of grip options, color, size, and materials to suit your individual project. Use in conjunction with our glow-in-the-dark Grip Tape for a complete stair system that is visible after dark or during power outages. Can be permanently installed with mechanical fasteners and/or adhesive.

- Unique surface nearly doubles both OSHA's 0.5 and the ADA's 0.6 guide lines for Coefficient of Friction values
- Suitable for indoor and outdoor use
- Logos and directional markings can be custom printed



## Hi-Traction Ladder Rung Covers

Available as both channel shaped and half-round covers made to suit rung diameters from $3 / 4$ " to 2 ".

## Hi-Traction Stair Covers

Stair covers that cover an entire step, not just the nose, to give you the best stair traction available. 15" midsection is photo-luminescent. Made to suit.

## Galvanized Steel

Schedule 40 and Schedule 80 ; size $1 / 4$ " to 2" IPS; nominal mill lengths of 21' cut to your projects' exact length requirements.

## Aluminum

Alloy 6105-T5 with an anodized finish; size range $3 / 4$ " to 2 " IPS; nominal mill lengths of $12^{\prime}$ and $24^{\prime}$ cut to your projects' exact length requirements.

## Antimicrobial Coating

Defense against the growth of potentially harmful invisible bacteria and fungi; this powder coating can be applied in a wide range of RAL colors.

## Powder Coating

Durable, corrosion preventing polyester coating applied to already galvanized/anodized products; available in any RAL color. Powder coating enhances visibility and integrates structure with building aesthetics.

| pipe reference | component <br> inner dia (in.) | nominal bore <br> (in.) | pipe outer <br> di. (in.) | tube outer <br> di. (in.) |
| :---: | :---: | :---: | :---: | :---: |
| 2 | 0.59 | 0.25 | .54 | 0.531 |
| 3 | 0.76 | 0.375 | .68 | 0.688 |
| 4 | 0.87 | 0.5 | .84 | 0.844 |
| 5 | 1.09 | 0.75 | 1.05 | 1 |
| 6 | 1.38 | 1 | 1.32 | 1.313 |
| 7 | 1.72 | 1.25 | 1.66 | 1.625 |
| 8 | 1.94 | 1.5 | 1.9 | 1.875 |
| 9 | 2.41 | 2 | 2.38 | 2.375 |



## Modules

Pre-assembled modules make for a simple and quick assembly or installation of your project. Provides constant barrier heights and lengths. Made to suit individual project requirements.


## compliancy

## Standard Building Code



## Section 1020, Business

1020.3 Handrails and guardrails. Exception: In areas not accessible to the public and in fully enclosed stairways in office buildings not serving an $\mathrm{A}, \mathrm{E}$ or R occupancy, the clear distance between rails or ornamental pattern shall be such to prevent the passage of a 21 -inch ( 533 mm ) diameter sphere.

## Section 1022, Factory-Industrial

1022.4 Handrails and guardrails. Exception: In areas not accessible to the public in Group F, the clear distance between rails or ornamental pattern shall be such to prevent the passage of a 21 -inch ( 533 mm ) diameter sphere.

## Section 1023, Hazardous

1023.2 Handrails and guardrails. Exception: In areas not accessible to the public in Group H,, the clear distance between rails or ornamental pattern shall be such to prevent the passage of a 21 -inch ( 533 mm ) diameter sphere.

## Section 1024, Institutional

1024.2.11 Handrails and guardrails. Exception: In areas not accessible to the public in Group I Restrained the clear distance between rails or ornamental pattern shall prevent the passage of a 21 -inch $(533 \mathrm{~mm})$ diameter sphere.

## Section 1025, Mercantile

1025.3 Handrails and guardrails. Exception: In areas not accessible to the public and fully enclosed stairways in Group M, not serving a Group A, E or R occupancy, the clear distance between rails or ornamental pattern shall be such to prevent the passage of a 21 -inch ( 533 mm ) diameter sphere.

## Section 1027, Storage

1027.5 Handrails and guardrails. Exception: In areas not accessible to the public in Group S, the clear distance between rails or ornamental pattern shall be such prevent the passage of a 21 -inch ( 533 mm ) diameter sphere.

## IBC/ICC

## International Building Code/International Code Council

### 1013.1 Guards: Where Required



Note: Information above is non-exhaustive. The user is responsible for compliance with all state, provincial, and local building codes and accessibility guidelines. Please consult the most current publication of the following for complete IBC/ICC guidelines. Copyright 2006, International Code Council, Inc., Country Club Hills, Illinois. International Building Code 2006. Reproduced with permission. All rights reserved.

Guards shall be located along open-sided walking surfaces, mezzanines, industrial equipment platforms, stairways, ramps and landings which are located more than 30 inches ( 762 mm ) above the floor or grade below. Guards shall be adequate in strength and attachment in accordance with Section 1607.7. Where glass is used to provide a guard or as a portion of a guard system, the guard shall also comply with section 2407. Guards shall also be located along glazed sides of stairways, ramps and landings that are located more than 30 inches ( 762 mm ) above floor grade below where the glazing provided does not meet the strength and attachments in Section 1607.7.

### 1003.2.12.1 Guards: Height

Guards shall form a protective barrier not less than 42 inches ( 1067 mm ) high, measured vertically above the leading edge of the tread, adjacent walking surface or adjacent seatboard.

### 1003.2.12.2 Guards: Openings Limitations

Open guards shall have a balusters or ornamental patterns such that a 4-inch-diameter (102 mm) sphere cannot pass through any opening up to a height of 34 inches ( 864 mm ). From height of 34 inches ( 864 mm ) to 42 inches ( 1067 mm ) above the adjacent walking surfaces, a sphere 8 inches (203 mm ) in diameter shall not pass.

## OSHA

## OSHA Standard Pipe Railing: 1910.23 Guarding floor and wall openings and holes



### 1910.23 (e) (ii]

For pipe railings, posts, and top and intermediate railings shall be at least 1-1/2" nominal diameter with posts spaced not more than $8^{\prime}$ on centers.

### 1910.23 [e][3][iv]

The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail.

### 1910.23 [e](4]

A standard toe board shall be 4" nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place and with not more than $1 / 4$ " clearance above floor level. [C](4) The railing shall be provided with the toe board wherever, beneath open sides, [i] persons can pass, [ii] there is moving machinery, or [iii] there is equipment with which falling materials could create a hazard.

## assembly

## Straight and Level Guard Rail Using Types 10, 15, 20, 21, 25, \& 26, or L10, L15, L20, L21, L25, \& L26,

Where:
$\mathrm{L}=$ distance between centers of uprights
I = length of horizontal pipe
$\mathrm{H}=$ distance from ground to center line of top rail
$h=$ length of upright pipe


Table 1 gives details of dimension ' $x$ ' in the formula:
$\mathrm{I}=\mathrm{L}-2 \mathrm{x}$
To calculate rail lengths and uprights use the formula:
$h=H-x \pm$ (ground fixing)*

Table 1: Dimension 'x' for Fittings Above \& Types 35, 40, \& L35*

| Fitting Size | $x$ (in.) |
| :---: | :---: |
| 2 | $-3 / 8$ |
| 3 | $-1 / 2$ |
| 4 | $-1 / 2$ |
| 5 | $-1 / 2$ |
| 6 | $-5 / 8$ |
| 7 | $-7 / 8$ |
| 8 | -1 |
| 9 | $-1-1 / 8$ |

Note: When reducing fittings are being used care must be taken to use the correct ' $x$ ' dimension. (i.e., Type 10-87, vertical pipe size 8 , horizontal pipe size 7 . To find the correct length of the horizontal pipe, the length ' $x$ ' is that for the size 8 vertical pipe.)
When using Types 35 and 40 the above ' $x$ ' dimension should be used.
Although guard rail is normally constructed in size 6, 7 and 8 pipe, Table 1 shows the cutting length for all KEE KLAMP pipe sizes, and can therefore be applied to many other rectangular structures.
*When using KEE LITE bases, L10, L15, L20, L21, and L26, "ground fixing" dimension will be zero.

## GUARD RAIL UP SLOPES $0^{\circ}-45^{\circ}$

Using Machined Fittings, Types 27, 28, \& 29

Where the upright remains vertical, i.e. ramps and stairways, (i) dimension ' $x$ ' to be subtracted from the upright centers dimension measured on the slope to give rail length. ( $I=L-2 x$ ) (ii) dimension ' $y$ ' to be added to the center dimension to give the length of the upright. ( $h=H+Y+$ ground fixing)

Note: between angles of $30^{\circ}$ and $45^{\circ}$ Type 29 fitting may be used to terminate the handrail, but for angles of less than $30^{\circ}$ use a Type 10 with the rail bent to fit.


Table 2 gives details of dimensions required for calculating the rail lengths, where angles are between $0^{\circ}$ and $45^{\circ}$.

Table 2: Rails

| Angle <br> of Slope | Size 6 Fittings: <br> ' $x$ ' (in) | Size 7 Fittings: <br> ' $x$ ' (in) | Size 8 Fittings: <br> ' $x$ ' (in) |
| :---: | :---: | :---: | :---: |
| $0^{\circ}$ to $4^{\circ}$ | $-3 / 4$ | $-7 / 8$ | -1 |
| $5^{\circ}$ to $9^{\circ}$ | $-7 / 8$ | -1 | $-1-1 / 8$ |
| $10^{\circ}$ to $11^{\circ}$ | -1 | $-1-1 / 8$ | $-1-1 / 4$ |
| $15^{\circ}$ | -1 | $-1-1 / 4$ | $-1-3 / 8$ |
| $20^{\circ}$ | $-1-1 / 8$ | $-1-1 / 4$ | $-1-1 / 2$ |
| $35^{\circ}$ | $-1-1 / 4$ | $-1-3 / 8$ | $-1-5 / 8$ |
| $30^{\circ}$ | $-1-3 / 8$ | $-1-5 / 8$ | $-1-3 / 4$ |
| $35^{\circ}$ | $-1-1 / 2$ | $-1-3 / 4$ | -2 |
| $40^{\circ}$ | $-1-5 / 8$ | $-1-7 / 8$ | $-2-1 / 4$ |
| $45^{\circ}$ | $-1-7 / 8$ | $-2-1 / 8$ | $-2-1 / 2$ |

Table 3 gives details of dimensions required for calculating the upright lengths, where angles are between $0^{\circ}$ and $45^{\circ}$.
Table 3: Uprights

| Angle <br> of Slope | Size 6 Fittings: <br> ' $y^{\prime}(\mathrm{in})$ | Size 7 Fittings: <br> ' $y^{\prime}(\mathrm{in})$ | Size 8 Fittings: <br> 'y' (in) |
| :---: | :---: | :---: | :---: |
| $0^{\circ}$ to $4^{\circ}$ | $+3 / 4$ | $+7 / 8$ | +1 |
| $5^{\circ}$ to $9^{\circ}$ | $+5 / 8$ | $+3 / 4$ | $+3 / 4$ |
| $10^{\circ}$ to $11^{\circ}$ | $+5 / 8$ | $+5 / 8$ | $+3 / 4$ |
| $15^{\circ}$ | $+1 / 2$ | $+5 / 8$ | $+3 / 4$ |
| $20^{\circ}$ | $+1 / 2$ | $+1 / 2$ | $+5 / 8$ |
| $35^{\circ}$ | $+3 / 8$ | $+1 / 2$ | $+5 / 8$ |
| $30^{\circ}$ | $+3 / 8$ | $+1 / 2$ | $+1 / 2$ |
| $35^{\circ}$ | $+3 / 8$ | $+3 / 8$ | $+1 / 2$ |
| $40^{\circ}$ | $+1 / 4$ | $+3 / 8$ | $+3 / 8$ |
| $45^{\circ}$ | $+1 / 4$ | $+1 / 4$ | $+3 / 8$ |

## GUARD RAIL UP SLOPES $0^{\circ}-11^{\circ}$

Using Types 86, 87, 88 and 89- size 8 only

Where the upright remains vertical, i.e., ramps and stairways, (i) dimension ' $x$ ' to be subtracted from the upright centers dimension measured on the slope to give rail length. ( $I=L-2 x$ ), (ii) dimension ' $y$ ' to be added to the center dimension to give the length of the upright. ( $\mathrm{H}=\mathrm{h}+\mathrm{y}+$ ground fixing)


Table 4 gives details of dimensions required for calculating the rail lengths, where angles are between $0^{\circ}$ and $11^{\circ}$.

Table 4: Rails

| Angle <br> of Slope | Size 8 Fittings: <br> ' $x$ ' (in) |
| :---: | :---: |
| $0^{\circ}$ to $4^{\circ}$ | -1 |
| $5^{\circ}$ to $9^{\circ}$ | $-1-1 / 8$ |
| $10^{\circ}$ to $11^{\circ}$ | $-1-1 / 4$ |

Table 5 gives details of dimensions required for calculating the upright lengths, where angles are between $0^{\circ}$ and $11^{\circ}$.

Table 5: Uprights

| Angle <br> of Slope | Size 8 Fittings: |
| :---: | :---: |
| ' $y^{\prime}$ (in) |  |

## GUARDRAILING UP SLOPES $30^{\circ}-45^{\circ}$ Using Adjustable Fittings, Types 29, 30, 55 \& 56, or Types L29 \& L30 size 6, 7 and 8

Where the upright remains vertical, i.e., stairways (i) dimension $x, y$, or $z$ to be subtracted from the upright centers. Dimension (L), to give the length of rail. (ii) dimension $u, v$ and $w$ for determining the upright length.


Table 6 gives details of dimensions required for calculating the rail lengths, where angles are between $30^{\circ}$ and $45^{\circ}$.

Table 6: Rails

| Angle of Slope | Size 6 Fittings: |  |  | Size 7 Fittings: |  |  | Size 8 Fittings: |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $x$ (in) | $y$ (in) | z (in) | $x$ (in) | $y$ (in) | z (in) | $x$ (in) | $y$ (in) | $z$ (in) |
| $30^{\circ}$ | -1-1/4 | -2-1/8 | -1-3/8 | -1-5/8 | -2-1/2 | -1-5/8 | -1-3/4 | -3 | -2-1/8 |
| $35^{\circ}$ | -1-3/8 | -2 | -1-1/2 | -1-3/4 | -2-3/8 | - 1-3/4 | -2 | -2-7/8 | -2-1/4 |
| $40^{\circ}$ | -1-1/2 | -1-7/8 | -1-5/8 | -1-7/8 | -2-1/4 | -1-7/8 | -2-1/8 | -2-1/2 | -2-3/8 |
| $45^{\circ}$ | -1-3/4 | - 1-3/4 | - 1-3/4 | -2-1/8 | - 2 | -2 | -2-3/8 | -2-1/2 | -1-5/8 |

Table 7 gives details of dimensions required for calculating the upright lengths, where angles are between $30^{\circ}$ and $45^{\circ}$.
Table 7: Uprights

| Angle of Slope | Size 6 Fittings: |  |  | Size 7 Fittings: |  |  | Size 8 Fittings: |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | u (in) | $v$ (in) | w (in) | u (in) | $v$ (in) | w (in) | u (in) | $v$ (in) | w (in) |
| $30^{\circ}$ | +1-3/8 | -1-1/4 | +1 | + 1-3/4 | -1-5/8 | +1-1/8 | +1-7/8 | -1-3/4 | + 1-1/4 |
| $35^{\circ}$ | +1-5/8 | -1-3/8 | +3/4 | +2 | -1-3/4 | + $7 / 8$ | +2-1/8 | -2 | +1 |
| $40^{\circ}$ | +1-7/8 | -1-1/2 | +1/2 | +2-3/8 | -1-7/8 | + $1 / 2$ | +2-1/2 | -2-1/8 | + $1 / 2$ |
| $45^{\circ}$ | + 2-1/4 | -1-3/4 | +1/8 | +2-3/4 | -2-1/8 | +1/8 | + 3 | -2-3/8 | +1/8 |

Table 7 gives details of dimensions required for calculating the upright lengths, where angles are between $30^{\circ}$ and $45^{\circ}$.

Table 8: Uprights and Rails using Types 55 and 56 - Size 8 Only

| Angle | $u(\mathrm{in})$ | $x_{1}(\mathrm{in})$ | $w(i n)$ | $x_{2}(\mathrm{in})$ |
| :---: | :---: | :---: | :---: | :---: |
| $20^{\circ}$ to $29^{\circ}$ | $-3 / 4$ | $-3 / 4$ | -2 | -2 |
| $30^{\circ}$ to $39^{\circ}$ | $-5 / 8$ | $-5 / 8$ | $-2-3 / 8$ | $-2-3 / 8$ |
| $40^{\circ}$ to $49^{\circ}$ | $-1 / 2$ | $-1 / 2$ | $-2-3 / 4$ | $-2-3 / 4$ |
| $50^{\circ}$ to $59^{\circ}$ | $-1 / 2$ | $-1 / 2$ | - | - |
| $60^{\circ}$ to $69^{\circ}$ | $-3 / 8$ | $-3 / 8$ | - | - |
| $70^{\circ}$ to $79^{\circ}$ | $-3 / 8$ | $-3 / 8$ | - | - |
| $80^{\circ}$ to $88^{\circ}$ | $-1 / 4$ | $-1 / 4$ | - | - |

## assembly cont.

## Shelving

## Using Type 46 or L46

Shelving with carrying rails positioned on the outside of the upright.


Table 9 gives the dimension ' $x$ ' to be subtracted from overall shelf width ' $L$ ' to give the length of the cross rail in the formula $I=L-x$. (Dim. $x$ accounts for the use of two Type 46 or L46 fittings.)
Table 9:

| Fitting Size | $x(\mathrm{in})$. |
| :---: | :---: |
| 4 | $-3-7 / 8$ |
| 5 | $-5-1 / 4$ |
| 6 | $-6-3 / 8$ |
| 7 | $-7-3 / 4$ |
| 8 | -9 |
| 9 | $-10-7 / 8$ |

## Construction of Braces and Struts Using Types C50, C51, \& C52, or LC50, LC51, \& LC52

When using multiple pipe sizes in one structure, Types F50-5 to F50-9 or LF50-6 to LF50-8 can all be combined with:

| M50-5 to M50-9 | LM50-6 to LM50-8 |
| :--- | :--- |
| M51-5 to M51-9 | LM51-6 to LM51-8 |
| M52-5 to M52-8 | LM52-6 to LM52-8 |

to construct combination fittings, (i.e., C50-75, C50-85, C51-655 and C52-855.)


Table 10 gives details of dimension ' $x$ ' to be subtracted to give the pipe length required for use with two Type F50 or LF50 fittings in the formula I-L-2x.

Table 10:

| Fitting Size | $x$ (in.) |
| :---: | :---: |
| 4 | $-1 / 2$ |
| 5 | -1 |
| 6 | -1 |
| 7 | -1 |
| 8 | -1 |
| 9 | $-1-1 / 4$ |

Note: Dimension ' $L$ ' is the length from pivot point to pivot point. The distance from upright to upright is dependent on the angle of the strut.

## PALLET RACKING

Using Type 46 or L46
Pallet racking with the carrying rails on the inside of the upright.


Table 11 gives dimension ' $x$ ' which must be subtracted from the overall width of the carrying rails, to give the length of the cross rail in the formula: $I=L-$ x. (Dim. x accounts for the use of two Type 46 or L46 fittings.)

Table 11:

| Fitting Size | $x$ (in.) |
| :---: | :---: |
| $4^{*}$ | $-1-7 / 8$ |
| $5^{*}$ | $-2-3 / 8$ |
| $6^{*}$ | $-7-7 / 8$ |
| 7 | $-3-3 / 8$ |
| 8 | -4 |
| 9 | -5 |

*Pallet racking is not recommended in less than size 7 pipe.

The length of the longitudinal member can be calculated from multiples of the length of the bay between the centers of uprights, plus dimension ' $z$ ' in Table 12. Dimension $z$ accounts for the length of pipe needed to go through topmost fitting to the fitting's termination. This applies to constructions using fitting Type 45 also.

Table 12: Additional Pipe Length to Reach Topmost Fitting's Termination.

| Fitting Size | $z$ (in.) |
| :---: | :---: |
| 3 | +1 |
| 4 | $+1-1 / 8$ |
| 5 | $+1-1 / 4$ |
| 6 | $+1-1 / 2$ |
| 7 | $+1-7 / 8$ |
| 8 | +2 |
| 9 | $+2-3 / 8$ |

Longitudinal pipes are joined using fittings Type 14 or 18 couplings, (use of Type 18 not recommended as a load bearing joint,) which must be positioned to occur at the edge of the Type 46 fitting, and must not all occur in the same bay at alternate levels.


Spigots can be either pipes or rods, riveted into position, or the Type 18 fitting. When using the latter, a gap of $3 / 4$ " must be allowed for the set screw fixing.

## Base and Wall Fixings*



Table 13 gives details of the ground fixing dimension ' $x$ ', to be subtracted from the height ' $H$ ' to give the length of the upright ' $h$ '.

Table 13:

| Flange Type | $x$ (in.) |
| :---: | :---: |
| 59 | $-3 / 8$ |
| 60 | $-3 / 8$ |
| 61 | $-1 / 4$ |
| 62 | $-1 / 4$ |
| 67 | $-1 / 4$ |

Table 14 gives details of the ground fixing dimension ' $x$ ', for Type 63-6 only, to be subtracted to give the length of the upright for each angle condition.

Table 14:

| Angle | $x$ (in.) |
| :---: | :---: |
| $45^{\circ}$ | $-1-1 / 2$ |
| $50^{\circ}$ | $-1-1 / 4$ |
| $60^{\circ}$ | -1 |
| $65^{\circ}$ | $-1 / 2$ |

Table 15 gives the dimension ' $x$ ' to be subtracted from the length of the upright for fittings, Types $64,65,67,68, L 68$, and L164.

Table 15:

| Fitting Size | $x$ (in.) |
| :---: | :---: |
| 6 | $-1 / 4$ |
| 7 | $-1 / 4$ |
| 8 | $-1 / 4$ |

Table 16 gives the ground fixing dimension ' $x$ ', to be added to the upright member to allow for the setting into the socket Type 66.

Table 16:

| Fitting Size | $x$ (in.) |
| :---: | :---: |
| 6 | $+4-1 / 2$ |
| 7 | +5 |
| 8 | +5 |

*When using KEE LITE bases and flanges, "ground fixing" dimension (x) will be zero, except when using flanges L164, L68, and LC58.

## Constructing Circles and Triangles

Slopes and radii present no problem to the KEE KLAMP galvanized railing systems. Fitting Types 27, 28, 29, 30, C50, C51, C52, 55, 56, 86, 87, 88 and 89 and the 90 range pedestrian guard rail fittings are designed to allow for raked handrail while keeping the uprights vertical. Pipe can be bent and radiused to suit most situations. Also, true lengths have to be determined where braces and struts are being used.
To enable Safety Rail Source to machine fittings and radius pipe some basic information is required, (e.g., angle of slope, arc lengths, etc.). We have provided simple formulas and work examples to help you solve individual problems.
Machined Fittings
Types 27 and 28 are held in stock as blanks. These are then machined to individual requirements. It is therefore essential when ordering that the required angle from the horizontal is stated. Other pipe lengths need to be determined when using fitting Types 29 and 30, C50, C51 and C52 and the 90 range pedestrian guard rail fittings.

## Worked Example

Consider the following concrete single flight staircase.


Where
$\mathrm{H}=$ Vertical height from 1st nosing to last nosing.
$\mathrm{h}=$ Vertical height from ground level to 1st nosing.
I = Horizontal dimension from 1st nosing to last nosing.
L = Hypotenuse dimension (Pitch Line) from 1st nosing to last nosing.

| Known Data |  | Formula for Side and Angle |  |
| :---: | :---: | :---: | :---: |
| $H \& L$ | $I=\sqrt{ }\left(L^{2}-H^{2}\right)$ | $\operatorname{Sin} B=\frac{H}{L}$ | $C=90^{\circ}-B$ |
| L \& I | $H=\sqrt{ }\left(L^{2}-I^{2}\right)$ | $\operatorname{Sin} C=\frac{1}{L}$ | $B=90^{\circ}-C$ |
| $H \& I$ | $H=\sqrt{ }\left(H^{2}-I^{2}\right)$ | Tan $B=\frac{1}{H}$ | $C=90^{\circ}-B$ |

Note: The table can be used to solve angles and true lengths for braces and struts.

## Step 1

From a simple site survey or information from a working drawing, obtain the following dimensions.

Note: For greater accuracy vertical dimensions should be taken by means of a Dumpy Level or a Theodolite.
$\mathrm{H}=$ vertical height from the 1st nosing to the last (55 in).
$\mathrm{L}=$ pitch line, the diagonal dimension from the 1st nosing to the last (96 in).

## Step 2

From the table to determine angle $B$ we use;
Sin $B=55 / 96$, Angle $B=35^{\circ}$
Ramps can be dealt with in a similar way. Most ramps have a stated gradient e.g. 1:12, for every 12 units traversed horizontally, 1 unit of vertical height is obtained.

## assembly cont.

## How to Make Jigs for Railing Posts: <br> Set-up

Step 1: Start with pre-cut pipe.


Step 2: Measure and locate fittings on first post only.


Step 3: Lay post horizontal, and insert two pieces of scrap pipe. This is all that's involved in setting up your jig! From this point, duplicate posts can be produced by unskilled labor, without further measuring, at the rate of $20-30$ posts per hour.


## Utilizing Jigs for Railing Posts: <br> Production

Step 1: Set top and middle fittings in place, unfastened, on the two pieces of scrap pipe.


Step 2: Insert pre-cut pipe into fittings, then add flange.


## Aluminum Racking Load Tables

Table 17: Aluminum beam load table (lbs.)

| Span | Fitting Size |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 6 | 7 | 8 | 9 |
|  | Pipe Size |  |  |  |
|  | 1" N.B. | 1-1/4" N.B. | 1-1/2" N.B. | 2" N.B. |
| $1 '$ | 3081 | 3413 | 10369 | 17966 |
| $2^{\prime}$ | 984 | 2198 | 3494 | 7510 |
| $3 '$ | 438 | 975 | 1551 | 3337 |
| 3' 6" | 321 | 717 | 1141 | 2453 |
| $4^{\prime}$ | 245 | 548 | 872 | 1877 |
| 4' 6" | - | 434 | 690 | 1483 |
| $5^{\prime}$ | - | 352 | 557 | 1200 |
| $5^{\prime \prime} 6^{\prime \prime}$ | - | 291 | 462 | 992 |
| $6{ }^{\prime}$ | - | 243 | 386 | 833 |
| 6' 6" | - | 208 | 329 | 710 |
| $7{ }^{\prime}$ | - | 178 | 283 | 613 |
| 7' 6" | - | - | 248 | 534 |
| 8' | - | - | 217 | 469 |
| $9 '$ | - | - | 171 | 370 |
| $10^{\prime}$ | - | - | - | 300 |

Table reflects a safety factor of 2:1


The values in Table 17 are an indication of a UDL that a rack consisting of two support pipes can support.

For uneven load distributions the required tube size must be determined by standard bending moment and deflection calculations assuming the KEE LITE joint to give a simply supported beam.

At loads greater than 1700 lbs.* consideration must be given to set screw slip. (*rating includes a safety factor of $2: 1$ )

Step 3: Simply tighten set screws, then lift off.

Table 18: Load table (lbs.) - unfixed upright

| Span | Fitting Size |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 6 | 7 | 8 | 9 |
|  | Pipe Size |  |  |  |
|  | 1" N.B. | 1-1/4" N.B. | 1-1/2" N.B. | 2" N.B. |
| $1^{\prime}$ | 5359 | 9201 | 11573 | 16274 |
| 1'3" | 3644 | 7651 | 10126 | 15418 |
| 1' 6" | 2858 | 5811 | 8101 | 14639 |
| 1 '9" | 1965 | 4358 | 6944 | 13082 |
| $2^{\prime}$ | 1107 | 3390 | 5381 | 11291 |
| $2^{\prime}{ }^{\prime \prime}$ | 893 | 2808 | 4340 | 8487 |
| 2'6" | 714 | 1598 | 3761 | 7397 |
| 2'9" | 589 | 1307 | 2777 | 6073 |
| $3 '$ | 553 | 1113 | 2488 | 5295 |
| $3^{\prime \prime}{ }^{\prime \prime}$ | 464 | 1017 | 2198 | 4516 |
| 3' 6 " | 393 | 871 | 1157 | 4282 |
| 3'9" | - | 774 | 1099 | 3504 |
| $4^{\prime}$ | - | 726 | 868 | 3192 |
| 4'3" | - | 678 | 839 | 2803 |
| 4' 6" | - | 629 | 787 | 1635 |
| 4'9" | - | - | 693 | 1323 |
| $5^{\prime}$ | - | - | 608 | 1227 |
| 5'3' | - | - | - | 1168 |
| 5' 6" | - | - | - | 1027 |
| 5'9" | - | - | - | 973 |
| $6{ }^{\prime}$ | - | - | - | 894 |
| $6^{\prime} 3^{\prime \prime}$ | - | - | - | 814 |
| 6' 6" | - | - | - | 774 |
| 6' 9' | - | - | - | - |
| $7{ }^{\prime}$ | - | - | - | - |

Table reflects a safety factor of $2: 1$


Table 18 gives an indication only of the safe load, in pounds, that may be carried between the above restraints by single Schedule 40 pipe when used as uprights.

At loads greater than 1700 lbs.* consideration must be given to set screw slip. (*rating includes a safety factor of $2: 1$ )

Table 19: Load table (lbs.) - fixed uprights

| Span | Fitting Size |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 6 | 7 | 8 | 9 |
|  | Pipe Size |  |  |  |
|  | 1" N.B. | 1-1/4" N.B. | 1-1/2" N.B. | 2" N.B. |
| $1 '$ | 7825 | 11138 | 13367 | 18299 |
| 1'3' | 7432 | 10557 | 13020 | 17909 |
| 1'6" | 6967 | 10412 | 12615 | 17754 |
| 1 '9' | 5788 | 9685 | 12152 | 17286 |
| $2^{\prime}$ | 5288 | 9201 | 11573 | 16975 |
| 2'3" | 4430 | 8329 | 11284 | 16352 |
| 2' 6" | 3859 | 7506 | 10589 | 15573 |
| 2' 9" | 3037 | 6537 | 9143 | 15418 |
| 3' | 2679 | 5714 | 7985 | 14561 |
| $3^{\prime \prime}{ }^{\prime \prime}$ | 2429 | 4939 | 7407 | 13627 |
| 3' 6" | 2072 | 4261 | 6828 | 12848 |
| 3' 9' | 1858 | 4068 | 5960 | 12069 |
| $4 '$ | - | 3390 | 5497 | 11291 |
| 4' 3' | - | 3147 | 4918 | 10512 |
| 4' 6 " | - | 2905 | 4340 | 8721 |
| 4' 9" | - | 2663 | 3935 | 8409 |
| $5 '$ | - | 2373 | 3587 | 7631 |
| 5' 3 " | - | 2179 | 3356 | 6852 |
| 5' 6" | - | - | 3182 | 6073 |
| 5' 9" | - | - | 2835 | 5606 |
| $6{ }^{\prime}$ | - | - | 2604 | 5295 |
| $6^{\prime} 3^{\prime \prime}$ | - | - | - | 5061 |
| 6' 6" | - | - | - | 4750 |
| 6' 9" | - | - | - | 4516 |
| 7 | - | - | - | 3971 |
| 7' 3' | - | - | - | 3815 |
| 7' 6" |  |  |  | 3504 |
| 7'9" | - | - | - | 3348 |
| 8' | - | - | - | - |
| 8' 3' | - | - | - | - |

Table reflects a safety factor of 2:1


Table 19 gives an indication only of the safe load, in Ibs., that may be carried between the above restraints by single Schedule 40 pipes when used as uprights.

At loads greater than 1700 lbs.* consideration must be given to set screw slip. (*rating includes a safety factor of $2: 1$ )

## Galvanized Racking Load Tables

Table 17: Beam load table (lbs.)

| Span | Fitting Size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 5 | 6 | 7 | 8 | 9 |
|  | Pipe Size |  |  |  |  |
|  | 3/4" N.B. | 1" N.B. | 1-1/4" N.B. | 1-1/2" N.B. | 2" N.B. |
| 1' | 1658 | 3123 | 5516 | 7669 | 13180 |
| $2^{\prime}$ | 829 | 1562 | 2758 | 3834 | 6590 |
| 3' | 553 | 1041 | 1838 | 2556 | 4393 |
| 3' 6" | 474 | 892 | 1576 | 2191 | 3766 |
| 4' | 414 | 781 | 1379 | 1917 | 3295 |
| 4' 6 " | 368 | 694 | 1226 | 1704 | 2929 |
| $5 '$ | 332 | 625 | 1103 | 1534 | 2636 |
| 5' 6" | 302 | 568 | 1003 | 1394 | 2396 |
| $6{ }^{\prime}$ | 277 | 520 | 919 | 1278 | 2197 |
| 6' 6" | 255 | 481 | 849 | 1180 | 2028 |
| $7{ }^{\prime}$ | 237 | 446 | 788 | 1096 | 1883 |
| 7' 6" | 221 | 417 | 735 | 1023 | 1757 |
| 8' | 207 | 390 | 690 | 959 | 1648 |
| $9^{\prime}$ | 184 | 347 | 613 | 852 | 1464 |
| $10^{\prime}$ | 166 | 313 | 551 | 767 | 1318 |

Table reflects a safety factor of 1.67:1


Table 17 gives an indication only of the safe load, uniformly distributed, in pounds, that may be carried per shelf consisting of front and back pipes when used as continuous beams.

For uneven load distributions or single spans, the required pipe size must be determined by standard bending moment calculations assuming a Kee Klamp joint to give a simply supported beam.
At loads greater than 2000 Ibs.* consideration must be given to set screw slip. (*rating includes a safety factor of 2:1)

Table 18: Load table (lbs.) - un-fixed upright

| Span | Fitting Size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 5 | 6 | 7 | 8 | 9 |
|  | Pipe Size |  |  |  |  |
|  | 3/4" N.B. | 1" N.B. | 1-1/4" N.B. | 1-1/2" N.B. | 2" N.B. |
| $1^{\prime}$ | 1868 | 3243 | 4445 | 5238 | 7738 |
| 1'3" | 1633 | 2958 | 4213 | 4955 | 7398 |
| 1'6" | 1420 | 2673 | 3875 | 4650 | 7160 |
| 1 '9' | 1213 | 2375 | 3630 | 4395 | 6785 |
| $2^{\prime}$ | 995 | 2108 | 3335 | 4138 | 6448 |
| 2' 3" | 840 | 1813 | 3048 | 3883 | 6210 |
| 2'6" | 700 | 1583 | 2753 | 3570 | 5848 |
| 2'9" | 603 | 1395 | 2505 | 3243 | 5575 |
| $3^{\prime}$ | - | 1220 | 2170 | 2985 | 5180 |
| $3^{\prime \prime}{ }^{\prime \prime}$ | - | 1078 | 1993 | 2698 | 4863 |
| 3' 6" | - | 948 | 1810 | 2418 | 4525 |
| 3' 9" | - | - | 1643 | 2250 | 4218 |
| $4^{\prime}$ | - | - | 1488 | 2065 | 3880 |
| 4'3" | - | - | 1313 | 1880 | 3675 |
| 4'6" | - | - | 1215 | 1698 | 3303 |
| 4'9" | - | - | - | 1560 | 3123 |
| $5^{\prime}$ | - | - | - | 1450 | 2918 |
| 5' ${ }^{\prime \prime}$ | - | - | - | - | 2693 |
| 5'6" | - | - | - | - | 2523 |
| 5'9" | - | - | - | - | 2398 |
| $6{ }^{\prime}$ | - | - | - | - | 2150 |
| 6' ${ }^{\prime \prime}$ | - | - | - | - | 2048 |
| 6' 6" | - | - | - | - | 1878 |
| 6' 9' | - | - | - | - | - |
| $7{ }^{\prime}$ | - | - | - | - | - |

Table reflects a safety factor of 2:1


Table 18 gives an indication only of the safe load, in pounds, that may be carried between the above restraints by single Schedule 40 pipe when used as uprights.

At loads greater than 2000 lbs.* consideration must be given to set screw slip. (*rating includes a safety factor of 2:1)

## vibration test

Table 19: Load table (lbs.) - fixed uprights

| Span | Fitting Size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 5 | 6 | 7 | 8 | 9 |
|  |  |  | Pipe Size |  |  |
|  | 3/4" N.B. | 1" N.B. | 1-1/4" N.B. | 1-1/2" N.B. | 2" N.B. |
| $1 '$ | 2045 | 3390 | 4635 | 5403 | 7975 |
| 1'3" | 1855 | 3183 | 4445 | 5235 | 7635 |
| 1'6" | 1633 | 2958 | 4213 | 4955 | 7443 |
| 1 '9" | 1493 | 2705 | 3948 | 4730 | 7160 |
| $2 '$ | 1283 | 2480 | 3715 | 4500 | 6843 |
| 2'3" | 1058 | 2245 | 3470 | 4268 | 6685 |
| 2'6" | 953 | 2020 | 3273 | 4003 | 6355 |
| 2'9" | 823 | 1780 | 2993 | 3730 | 6063 |
| $3 '$ | 700 | 1583 | 2703 | 3523 | 5835 |
| $3^{\prime \prime}{ }^{\prime \prime}$ | 635 | 1435 | 2563 | 3283 | 5520 |
| $3^{\prime} 6$ " | - | 1288 | 2283 | 3083 | 5270 |
| 3'9" | - | 1160 | 2085 | 2858 | 4978 |
| $4 '$ | - | 1025 | 1938 | 2603 | 4818 |
| 4'3" | - | - | 1783 | 2393 | 4503 |
| 4'6" | - | - | 1643 | 2225 | 4218 |
| 4'9" | - | - | 1488 | 2098 | 3958 |
| $5 '$ | - | - | 1363 | 1920 | 3675 |
| 5'3" | - | - | 1270 | 1785 | 3415 |
| $5^{\prime} 6$ " | - | - | - | 1698 | 3268 |
| 5'9" | - | - | - | 1520 | 3088 |
| $6{ }^{\prime}$ | - | - | - | 1450 | 2918 |
| 6' 3" | - | - | - | - | 2715 |
| 6' 6" | - | - | - | - | 2578 |
| 6' 9" | - | - | - | - | 2398 |
| $7{ }^{\prime}$ | - | - | - | - | 2263 |
| 7'3" | - | - | - | - | 2150 |
| 7'6" |  |  |  |  | 2048 |
| 7'9" | - | - | - | - | 1913 |
| $8{ }^{\prime}$ | - | - | - | - | - |
| $8^{\prime} 3 \prime \prime$ | - | - | - | - | - |

Table reflects a safety factor of 2:1


Table 19 gives an indication only of the safe load, in lbs., that may be carried between the above restraints by single Schedule 40 pipes when used as uprights.
At loads greater than 2000 lbs.* consideration must be given to set screw slip. (*rating includes a safety factor of 2:1)

## Test Report:

## Vibration of Kee Klamp ${ }^{\oplus}$ Assemblies

Exhaustive tests on samples of standard size 7 KEE KLAMP fittings were performed by an independent research laboratory. The purpose of the test was to evaluate the use of either standard set screws or self-locking set screws.

## Test Arrangement

A "Tee" section test assembly was made using three 12 ft . lengths of galvanized size 7 standard pipe held together by a three socket tee fitting (Type 25-7). The vertical leg of the test assembly was supported in a standard railing flange (Type 62-7). The completed assembly was then rigidly attached to the vibration table.
The test assembly was initially assembled using standard set screws and tested in this configuration. The standard set screws were then replaced with the self-locking screws and the tests repeated.

## Test Procedure

The test was conducted on a Ling 667 kg Electromagnetic vibration table. The table was programmed to perform a resonance search between 25 and 350 Hz . and resonant frequencies were recorded and shown in Table 20. During the resonance search amplification factors, Q , were measured at each resonant frequency, the point of reference being the end of one horizontal pipe. The table was then held at one of the resonant frequencies, set in motion with a controlled

Table 20: Test Results

| Resonance Frequencies | Q Factor | Running Time |
| :---: | :---: | :---: |
| 74 | 1.27 | Nil |
| 106 | 1.27 | Nil |
| 158 | 1.53 | 6 hours |
| 200 | 1.8 | 6 hours |
| 221 | 5 | 6 hours |
| 295 | 9 | 6 hours |

During the twenty-four hours of vibration at the four resonant frequencies above no signs of loosening with either type of attachment screw occurred.

Telescopic Relationship: The telescopic relationship between Schedule 40 and Schedule 80 steel pipe.

| 2" | Schedule 40 | will accept 1 1/2" Schedule 40 or 80 |
| :---: | :---: | :---: |
|  | Schedule 80 | will accept 1 1/2" Schedule 40 or 80 |
| 1-1/2" | - | no telescopic relationship, |
|  | - | requires special spigotting material |
| 1-1/4" | Schedule 40 | will accept 1" Schedule 40 or 80 |
|  | Schedule 80 | no telescopic relationship, requires special spiggoting material |
| 1 " | - | no telescopic relationship, |
|  | - | requires special spigotting material |
| 3/4" | - | no telescopic relationship, |
|  | - | requires special spigotting material |
| 1/2" | - | no telescopic relationship, |
|  | - | requires special spigotting material |
| 3/8" | - | no telescopic relationship, |
|  | - | requires special spigotting material |
| 1/4" | - | no telescopic relationship, |
|  | - | requires special spigotting material |



Below:
Waste Water Treatment Safety Guardrail


Right: ADA Compliant Railing for Public Access

Right:
Industrial Process Plant
Structures

Right:
ADA Compliant Railing for Ac-
cess Ramps

Right:
Warehouse and Manufacturing Safety Screen


## fax inquiry

## Fax Your Technical Request to Safety Rail Source in the USA at (610) 539.9535

Please check the following boxes as needed: $\square$ Catalog Request $\square$ Technical advice $\square$ Quotation The PROJECTS Division provides the customer with the best possible service from product specification through purchase and delivery to installation advice. (* indicates required field.)
Company Name $\qquad$
Your Name* $\qquad$ Position $\qquad$
Street Address $\qquad$
City $\qquad$ State/Prov $\qquad$ Zip/Postal Code $\qquad$
Telephone* $\qquad$ Ext. $\qquad$ Fax $\qquad$
Email Address* $\qquad$ Website $\qquad$
Please supply as much information as possible so we can properly process your request.

| Finish: $\square$ Steel | $\square$ Stainless Steel | $\square$ Aluminum | $\square$ Powder Coated |
| :--- | :--- | :--- | :--- |
| Size: $\square 6\left(1^{\prime \prime}\right)$ | $\square 7(1-1 / 4 ")$ | $\square 8\left(1-1 / 2^{\prime \prime}\right)$ | $\square 9(2 ")$ |

For Railing: $\square$ Inline $\quad$ Offset
Number of Horizontal Rails: $2 \quad \square 3$ Other (please specify) :
ADA: $\square$ Yes

- No
Anti-Slip Required:
$\square$ Yes
- No
Railing Grip Tape Required:
Y Yes
- No

Approximate Length of Run: $\qquad$ ft .

Use the space below to provide additional information or a sketch of your application. You can add any additional data sheets that may be useful. Number of pages faxed $\qquad$



## Turnkey Safety Solutions

We at Safety Rail Source have dedicated construction professionals who have worked within the construction industry for many years. Together with their expert in-dustry knowledge and our safety product ranges, our team is fully capable of providing you with safety guardrail and handrail solutions that will service your project needs.

Whether dealing with new, refurbishment or upgrading of existing structures and developments, we can provide safety compliant guardrail and handrail designs, whether it be internal, external, at ground level, or roof level.
We can also advise you on project costs, manage completion time scales from inception to meet your site requirements, and also ensure compliance of our systems with current North American Legislation and Safety requirements.

## Custom Services

Our dedicated technical service team can provide advice and solutions. We have CAD facilities and design software to enable us to interpret your design requirements and provide you with a solution.

We can visit the location to execute a full inspection including a measuring service so that the correct information is gathered. Furthermore, we are able to provide a full installation service to assist in meeting any deadlines and site needs. Our installation teams are professional and excel in the assembly of our safety systems.
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