



ACE Structural Engineering Applications LLC

ACE FrameWorks Caged Ladder Documentation

Caged Ladder (ACE_CL.MA)

(Current Versions - FWP 3.1.x.x/3.2.x.x rel 2.1.7 & FWP 7.0.x.x rel 7.1.7 & FWP 7.1/7.2/7.3 rel 6.1.7 & FWP 8.0.x.x rel 8.1.7 & FWP 9.0.x.x rel 9.1.7 & FWP 10.0.x.x rel 10.1.7 & FWP 11.0.x.x rel 11.1.7 & FWP 12.0.x.x rel 12.1.7)

The caged ladder program facilitates the placement of ladders with or without cages. The following type caged

ladders are supported: step through; side step right; side step left; and side step left/right. Ladders can be placed at any orientation normal to the XY plane. The resultant ladder is always parallel to the Z-axis (vertical) but can be at any angle rotated about the Z-axis. For a step through ladder, the ladder top rails may be straight or may taper outwards. A variable rail specification (rail profile & properties) based on ladder height is optionally available. Interior right step, left step or right & left step landings (10 max) may optionally be defined. A sparse or dense hoop representation (5 or 7 support bars with or without internal hoops) may be utilized. Interference solids, which envelope the cage & ladder, may be placed in FrameWorks as solids to aid interference detection. The “solids envelope” may be placed as a tight fit or may be enlarged both laterally & vertically. The caged ladder utility supports both English (ft/in) or Metric (m/mm) units. The caged ladder application also supports an immediate undo option after placement. The ensuing pages

contain illustrations, which define the ladder components & dimensions and show basic ladder configurations.

The utility has internal defaults for ladder and cage section sizes, types, classes and grades. Ladder & cage dimensions also have internal default values. In addition, all input parameters shown in the dialog boxes shown (left and on next page) have default values. There are two options for cage (hoop) geometry controlled by definable variables in the definition file. Definition files (containing user defined defaults) may be utilized to override internal defaults. Definition files allow for easy company and/or client configuration specification. Using the definition file capability, virtually any configuration of cage & ladder details can be specified. Definition files are discussed in detail later in this document (page 19).

Ladder Placement Methods

Four modes/methods are available for ladder placement. Ladders may be placed by: 1) specifying a base point and a ladder top step rung height; 2) specifying a base point and a top step rung elevation; 3) specifying a top step

- Define Base Point & Height to Top Step Rung
- Define Base Point & Top Step Rung Elevation
- Define Top Step Rung Point & Base Elevation
- Data Points for Base & Top Step Rung

rung location and a base elevation or 4) interactively specifying two points w/ datapoints (a control point & a elevation point – first point is control point – specifies x & y location). This utility also features the “Last Data Point” technique, where a coordinate of a previous data point

may be selected. The “Last Data Point” technique eases the point selection process and can be utilized in the first three methods of placement.

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Pressing the “Show Parameters Button” will yield the dialog box shown at the left. All of the values can (and should) be controlled w/ company and/or project specific configuration variables. The parameters consist of the ladder, riser and cage configuration variables. These variables include but are not limited to ladder width, ladder top treatment, riser spacing, minimum ladder height, minimum and maximum riser spacing. The minimum ladder height (Rail bottom to top step riser) for cage placement is also shown. If interior hoops are enabled, the maximum spacing for interior hoops is shown. The configuration of the cage hoops can also be totally controlled. Finally, the naming technique for ladder components can be controlled

ACE Steel FPL Utilities	ACESEA(c) 1998-2010
GENERAL CAGED LADDER PARAMETERS	
Step Through Ladder of Width: 1.500 with Top Taper	
RISER & LADDER PARAMETERS	
Rail Bottom to Top Step Riser: 21.000	
Distance from Top Step Riser to Ladder Top: 4.000	
Riser Spacing: 1.000 Minimum Number of Risers: 5	
Min & Max Heights of Bottom Riser: 0.500 and 1.500	
Min Ladder Height for Cage: 14.000	
CAGE PARAMETERS (Original Cage w/ 5 Support Bars)	
Distance to Bottom Cage: 7.500	
Cage Transition Distance: 4.000	
Distance to Top Cage: 0.500	
Distance to Second Top Cage: 4.500	
Interior Hoops will be Placed w/ Max Spacing: 4.000	
Hoop Values Offset: 0.250 Straight Length: 1.000	
Hoop Radius Interior Hoop: 1.000 Main Hoop: 1.500	
Dynamic naming Active (Default Name - LDR_201)	
<input type="button" value="OK"/>	

Show Parameters Dialog Box

Pressing the “Show Section Details” button will yield the dialog box shown at the left. The section details consist of the properties of the rungs, rails, main (top & bottom) hoops, intermediate hoops, support bars and interference envelope (if requested). The properties consist of: section profile, grade, type, class and named group (if specified). The interference envelope properties are slightly different and include the class, grade, material and named group if specified. If extra space for interference envelope has been specified, the additional edge distance is shown. All of the values shown in the dialog box can (and should) be controlled w/ company and/or project specific configuration variables.

ACE Steel FPL Utilities	ACESEA(c) 1998-2010
LADDER SECTION DETAILS	
RUNG SECTION (CP: 5)	
Section: SR3/4	Class: 4 (NG: 2)
Grade: A36	Type: HBRACE
RAIL SECTION	
Section: L3x2x1/4	Class: 5 (NG: 1)
Grade: A36	Type: HBRACE
TOP & BOTTOM HOOPS SECTION (CP at outside)	
Section: SB1/2SQ	Class: 7 (NG: 0)
Grade: A36	Type: HBRACE
INTERMEDIATE HOOPS SECTION (CP at outside)	
Section: SB1/4SQ	Class: 8 (NG: 3)
Grade: A36	Type: HBRACE
HOOP SUPPORT BARS SECTION (CP at center)	
Section: SB1/2SQ	Class: 6 (NG: 5)
Grade: A36	Type: HBRACE
ENVELOPE PARAMETERS w/ Extra Space: 0.250	
Class: 8 (NG: 1) Grade: ACCESS Material: 2	
<input type="button" value="OK"/>	

Show Section Details Dialog Box

Ladder Naming Options

For a given caged ladder, all components are given the same name by concatenating the FWP ID to a prefix. The default prefix is LADDER, however a different prefix may be specified in the definition file. Other naming options include 1) a constant specified name for all ladders, 2) dynamic naming where the ladder name with or without FWP_ID appended is defined at placement time or 3) FrameWorks normal naming for individual components (FWP autoname). (See definition file section for more naming details)

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Variable Rail Specification – Optional Capability

A rail profile may be specified as a function of the ladder height, base to 1st step rung. When a variable rail specification is included in the definition file, the dialog box looks as shown at left. The variable specification is accomplished with the RAIV command in the definition file. In addition to profile properties, the RAIV command also specifies a height range, fHeightLow & fHeightHigh. The order of specification of RAIV commands is important.

ACE Steel FPL Utilities ACESEA(c) 1998-2004

CAGED LADDER
(All Units Feet)

Rail Section :

Rung Section : ☒ Use Variable Rail

☒ Place Ladder with Cage ☒ Place Interference Envelope

Exterior Hoop Section :

Interior Hoop Section : ☐ Int Hoops

Hoop Supt Bar Section :

Ladder Type :

Ladder Orientation :

Placement Mode :

Ladder Base Point

North Coord East Coord

Elevation

Ladder Top Step Rung Point

Ladder Height

At placement time, the RAIV specifications are studied from 1st to last. If the ladder height (base to 1st step rung) is inclusively between fHeightLow & fHeightHigh, that rail profile & properties will be utilized. If a conforming RAIV profile is not found, the RAIL specified profile is utilized.

Even if a variable rail is specified in the definition file, the variable rail specification can be toggled off so that the Rail Section shown on the primary dialog box is utilized.

To view variable rail definition, press the “View Variable Rail Details” button. The variable rail specifications are listed from 1st to last in the dialog box shown at the left. At placement time, the specifications are studied from 1st

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VARIABLE RAIL DETAILS

VARIABLE RAIL SECTIONS

Section: L4X3X3/8	from	10.000	to	15.000
Class: 3 (NG: 1) Type: HBRACE	Grade: A36			
Section: L5X3X7/16	from	15.000	to	30.000
Class: 1 (NG: 1) Type: HBRACE	Grade: A36			

to last. The first variable rail specification that matches the ladder height is utilized for the rail profile & properties. If none of the specifications match, the rail profile and properties on the primary dialog box (specified by RAIL command or keyed in) will be utilized.

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Interior Landings – Optional Capability

Interior landings may be defined if the LAND option is present in the definition file. If the LAND option is

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CAGED LADDER
(All Units Feet)

Rail Section : L3x2x1/4
Rung Section : SR3/4
☒ Place Ladder with Cage ☒ Place Interference Envelope
Exterior Hoop Section : SB1/25Q
Interior Hoop Section : SB1/45Q ☐ Int Hoops
Hoop Supt Bar Section : SB1/25Q
Ladder Type : Step through Ladder
Ladder Orientation : Looking North (90 deg)
Placement Mode : Define Base Point & Height to Top Step Rung
Ladder Base Point
North Coord 0.000 East Coord 0.000
Elevation 0.000 Set Coordinates to Last Data Point
Ladder Top Step Rung Point
Ladder Height 21.000
Show Parameters Show Section Details
Place Caged Ladder Define Landing Cancel

present, the primary dialog box will look as shown at the left (note in this case the variable rail option is not active). The “Define Landing” command indicates that landings can be defined but none are presently defined. Up to 10 interior landings may be defined. The base elevation for an interior landing must be equal to or greater than the cage_dis + cage_trans value. A landing may have a right step, left step or right & left step opening. Each landing also has a landing height. When a landing is defined, the vertical support bar will be omitted on the corresponding side(s) from the landing base elevation to the landing height. In addition, interior hoops may be specified for the landing. The landing hoop options include: no hoops, hoop at base elevation, hoop at landing top or hoops at landing top & base.

Primary Dialog Box w/ Landing Capability Activated

If the “Define Landing” command is activated, the following dialog box appears:

Define/Modify Caged Ladder Landings

Landing Type: Right Side Step
Landing Hoops: Hoop at Landing
Base Elev: 14.000
Height: 7.000
Accept Landing Reject Landing

Define/Modify Landing Dialog Box

The landing type is controlled with the landing type option button and may be: Right Side Step, Left Side Step or Right & Left Side Step. Interior hoops may be defined with the interior hoops option button and may be: None, Hoop at Landing, Hoop above Landing and Hoop at & above Landing. The Base Elev is the elevation where the landing begins and must be above the (cage_dis + cage_trans) location. The Height is the height of the interior landing. The initial height shown is controlled by the variable fLandingHeight on the LAND definition command. The initial hoop option button setting is controlled by the variable iLandingHoop on the LAND definition command.

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Interior Landings – Optional Capability (con'd)

Once the first interior landing is defined, the primary dialog box will look as shown at the left. The “Define Landing” command is now “Show/Modify Landings”. The Show/Modify Landings command can be utilized to: view presently defined landings, modify a currently defined landing, define another landing, delete a landing or delete all landings. Note that interior landings must be placed from the bottom of the ladder to the top (i.e. the base elevation for each subsequent landing must be above any previously defined interior landing. An interior landing elevation must also be below the top step rung. At placement time, interior landings are checked to see that the minimum and maximum elevations are not exceeded. If the elevations are exceeded, a info box displaying a error message appears. Interior landings must be correct or the caged ladder will not place.

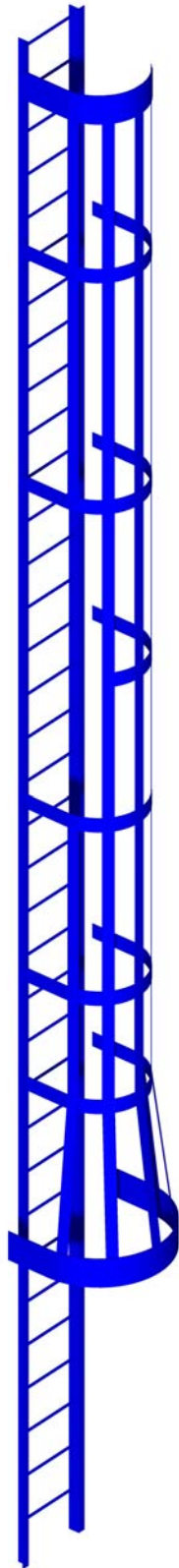
Primary Dialog Box w/ Interior Landing(s) Defined

If the “Show/Modify Landing” command is activated, the following dialog box appears:

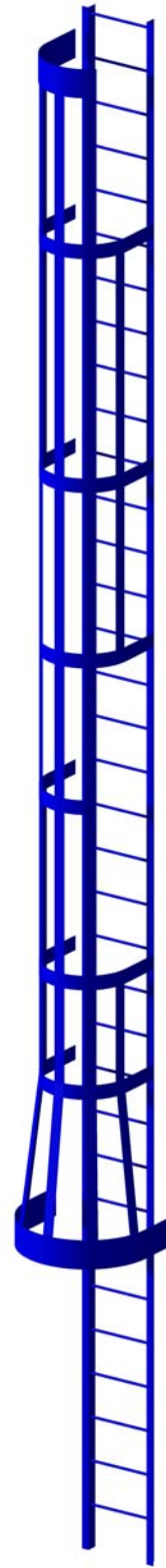
Show/Modify Interior Landings Dialog Box

The above dialog box allows individual landings to be viewed, modified or deleted. All landings can be deleted with the “Delete ALL Landings” command. A new landing may be defined with the “Define New Landing” command. Once defined, landing definitions are retained until deleted.

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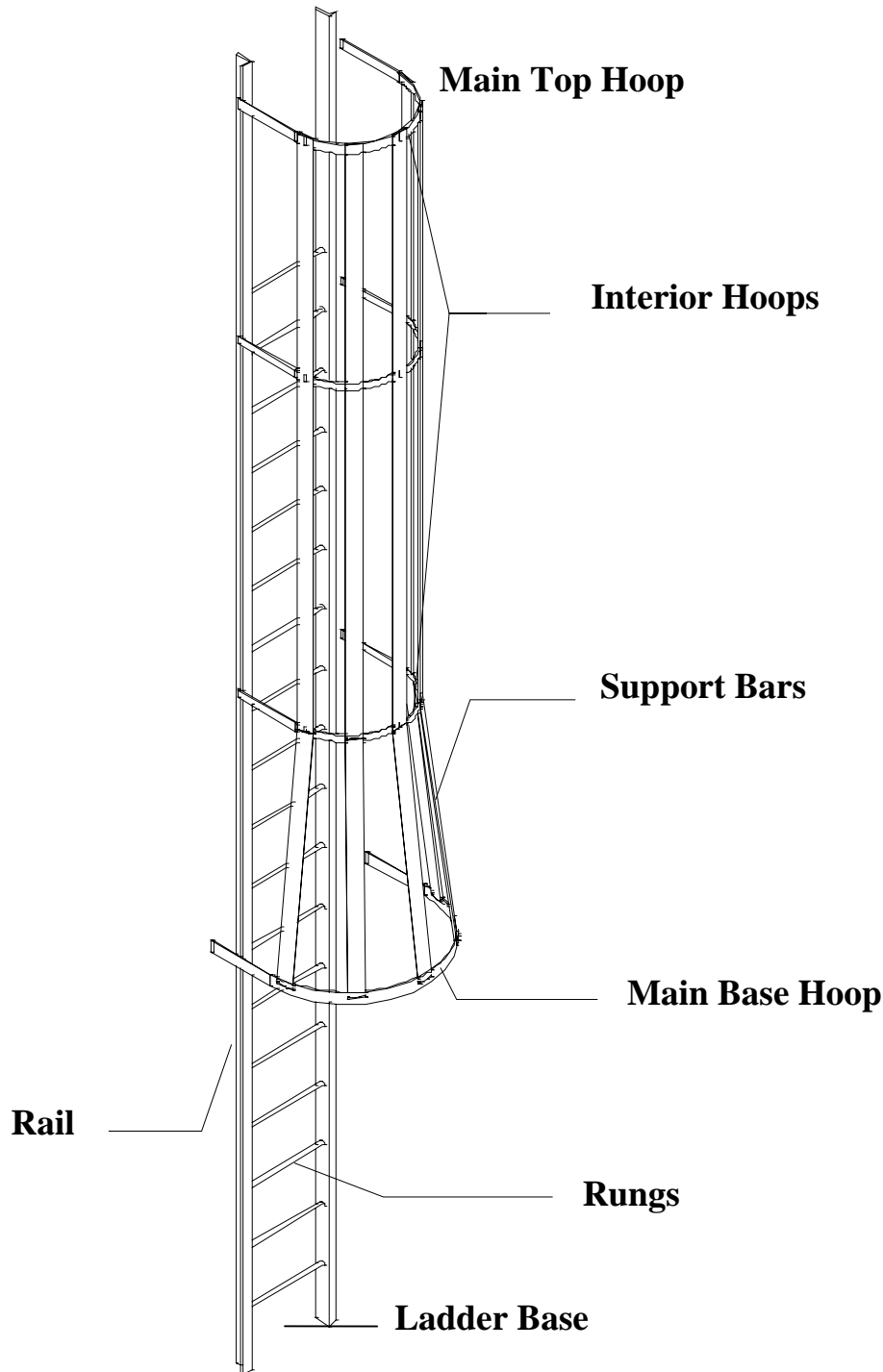
Left Step Interior Landing



Right Step Interior Landing

Side Step Right Caged Ladder (ladder height = 30' with base elev 0') with both a side step right (elev 14' to 21') and side step left (elev 18' to 25') interior landing. Hoops were placed at top & bottom for both landings.

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Caged Ladder Definitions

(Typical Step Through Ladder)

(Step Through Ladder may have Tapered Top Rail)

(Taper is from rail position to interior hoop extent)

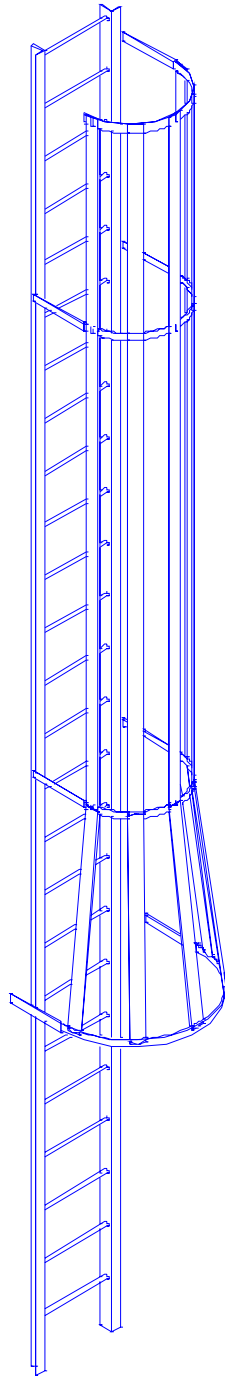
(Taper begins at ladder_ext and goes to ladder top)

(Note that the diagram shown above has “sparse hoop” configuration – 4 hoops)

(Note above ladder utilizes default cage (original) – Cage B can be specified)

(Note above ladder has 5 support bars – 7 support bars can be specified)

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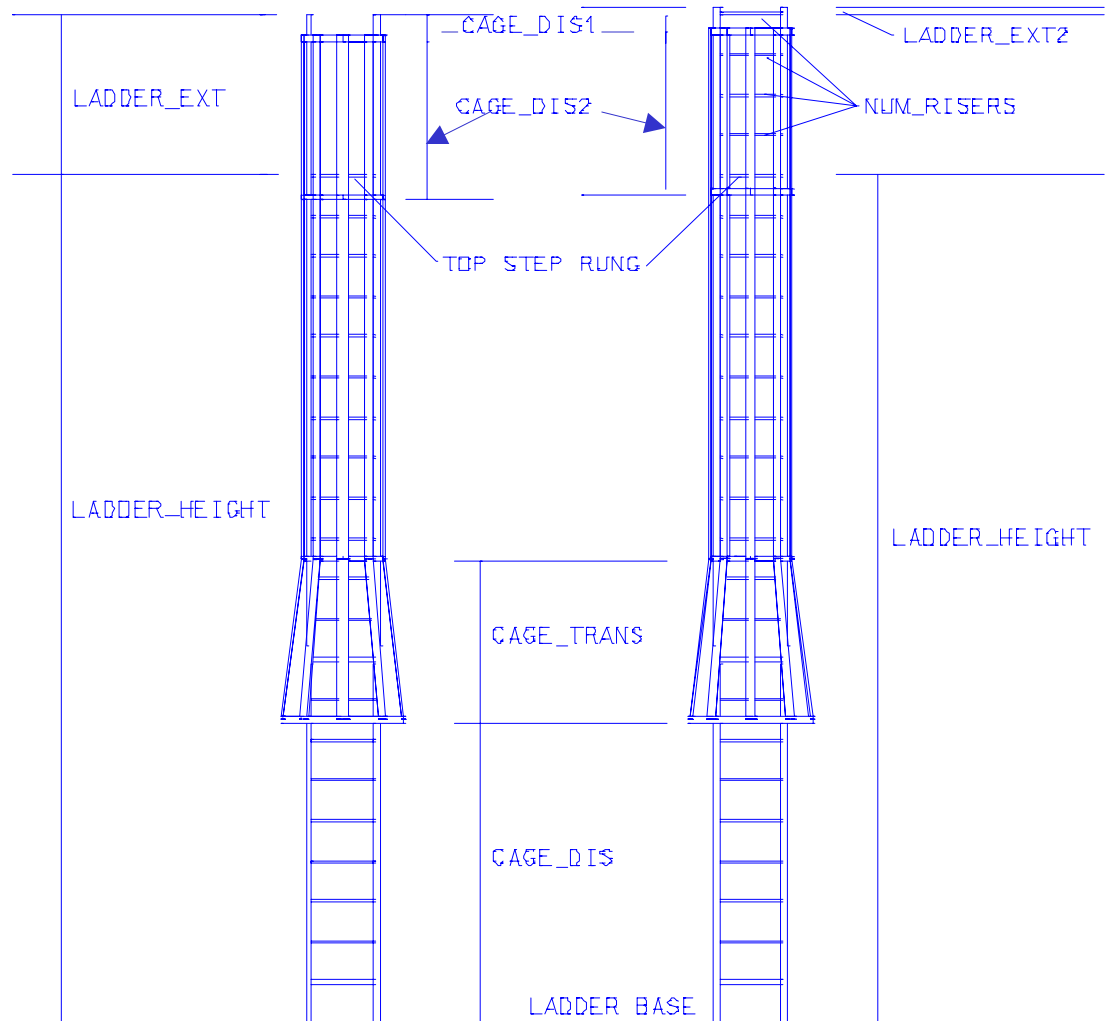
Typical Side Step (Left) Ladder

(Note that the diagram shown above has “sparse hoop” configuration – 4 hoops)

(Note above ladder utilizes default cage (original) – Cage B can be specified)

(Note above ladder has 5 support bars – 7 support bars can be specified)

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Step Through Ladder

Side Step Ladder

(Note that the diagrams shown above have “sparse hoop” configuration – 4 hoops)

Parameter Definitions

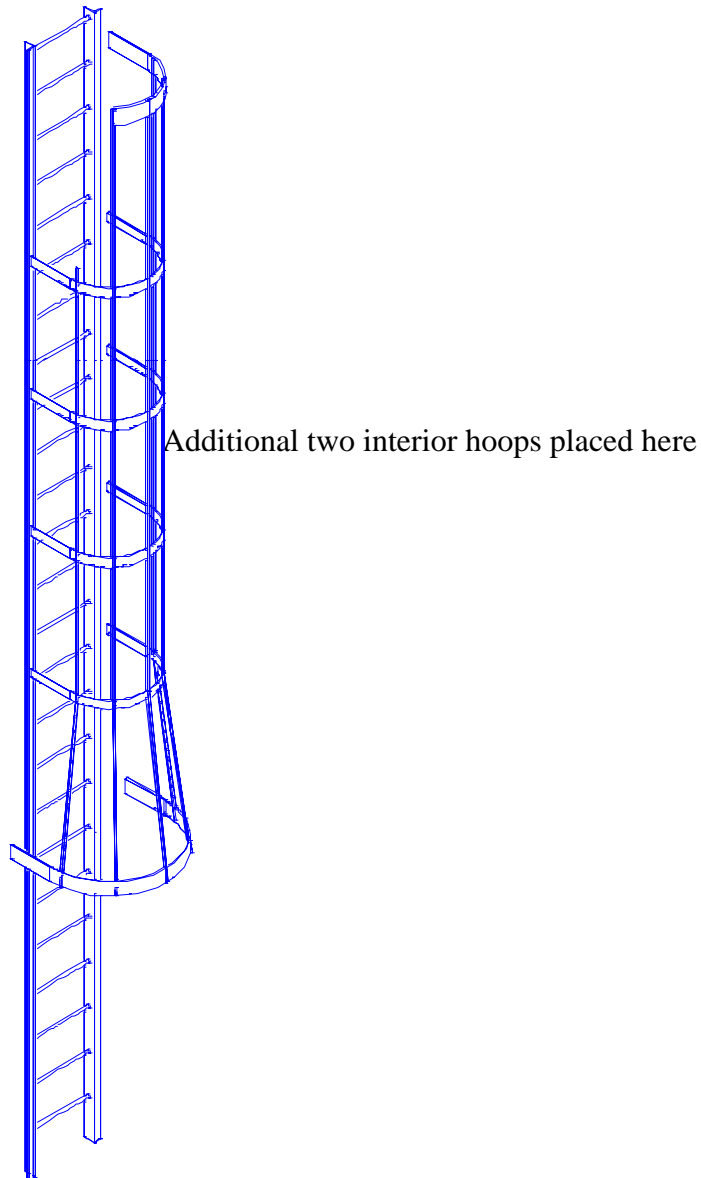
Note that the location of the top two cage hoops can be controlled by variables other than CAGE_DIS1 & CAGE_DIS2. An optional CAG2 command has been provided in the definition file, which allows separate specification for hoops for step through & side step ladders. The CAG2 command allows the top hoop to be located relative to the top step rung and the second cage hoop to be located a specific distance from the top cage hoop. If the CAG2 command is provided the CAGE_DIS1 & CAGE_DIS2 variables are not utilized. See page 25 for CAG2 command description. The above defines the “sparse hoop” configuration which consists of two top hoops, a transition hoop and a base hoop (4 hoops total). If interior landing are utilized, additional interior landing hoops may be placed. If interior hoops is specified in the definition file, a minimum interior hoops spacing may be specified as described in the next section.

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Caged Ladder (con'd)

Interior Hoops – Optional Capability

The Caged Ladder application incorporates an optional "intermediate (interior) hoop" capability. If the DEF file specifies the INTH command, the intermediate hoop capability is activated. This capability may be toggled off. When the INTH command is issued a maximum spacing for interior hoops is established. If the distance between any of the hoops from the top hoop to the transition hoop is more than the maximum spacing, intermediate hoops will be placed between at equal distance for that segment. If there are landings and landing hoops this can create different spacings at different areas of the Caged Ladder - this can be prevented/controlled by not placing landing hoops however different hoop spacing may not be objectionable. If there are no landing hoops and the INTH command is not specified or toggled off they will only be four (4) hoops total placed. A sample of a side step left ladder w/ interior hoops option turned on is shown below.



Side Step Ladder with Intermediate Hoop Option on – Max Spacing 4 feet

(Note that the diagram shown above has “dense hoop” configuration – 6 hoops)

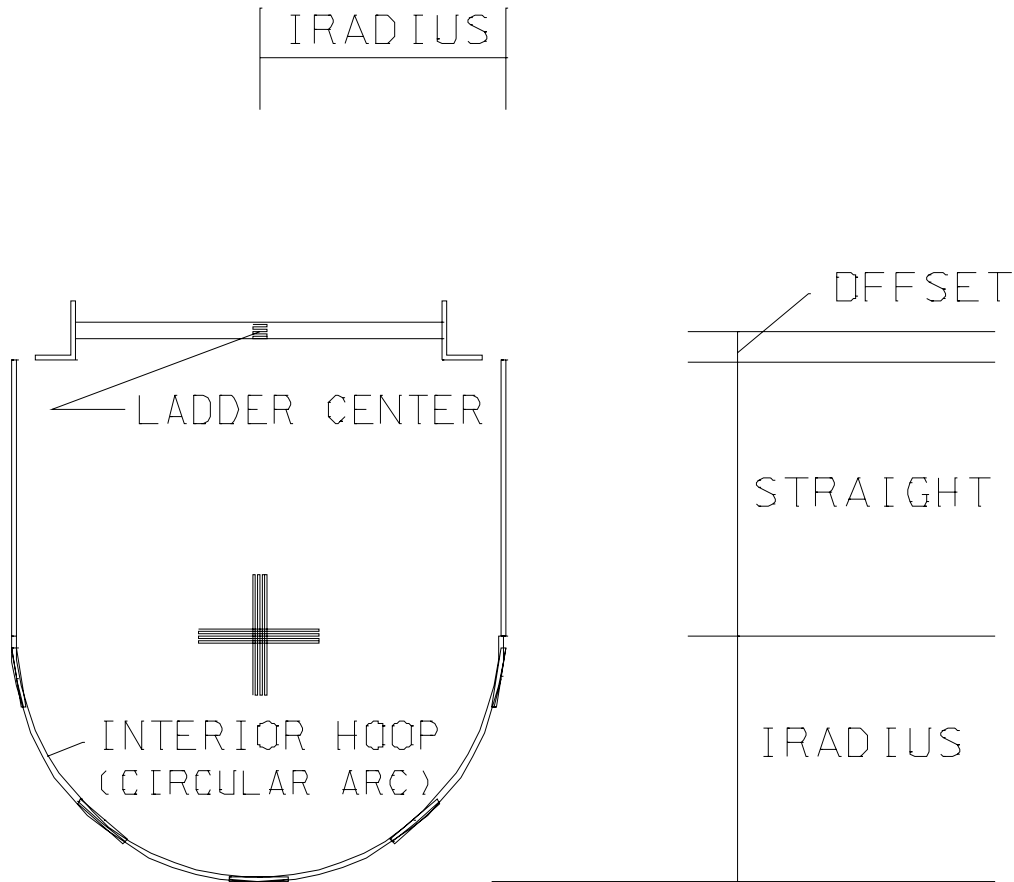
(2 additional interior hoops were placed)

(Note above ladder utilizes default cage (original) – Cage B can be specified)

(Note above ladder has 5 support bars – 7 support bars can be specified)

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Hoop shown below is the default (original hoop). Optional hoop type Cage B is shown on pages 13, 14 & 15.

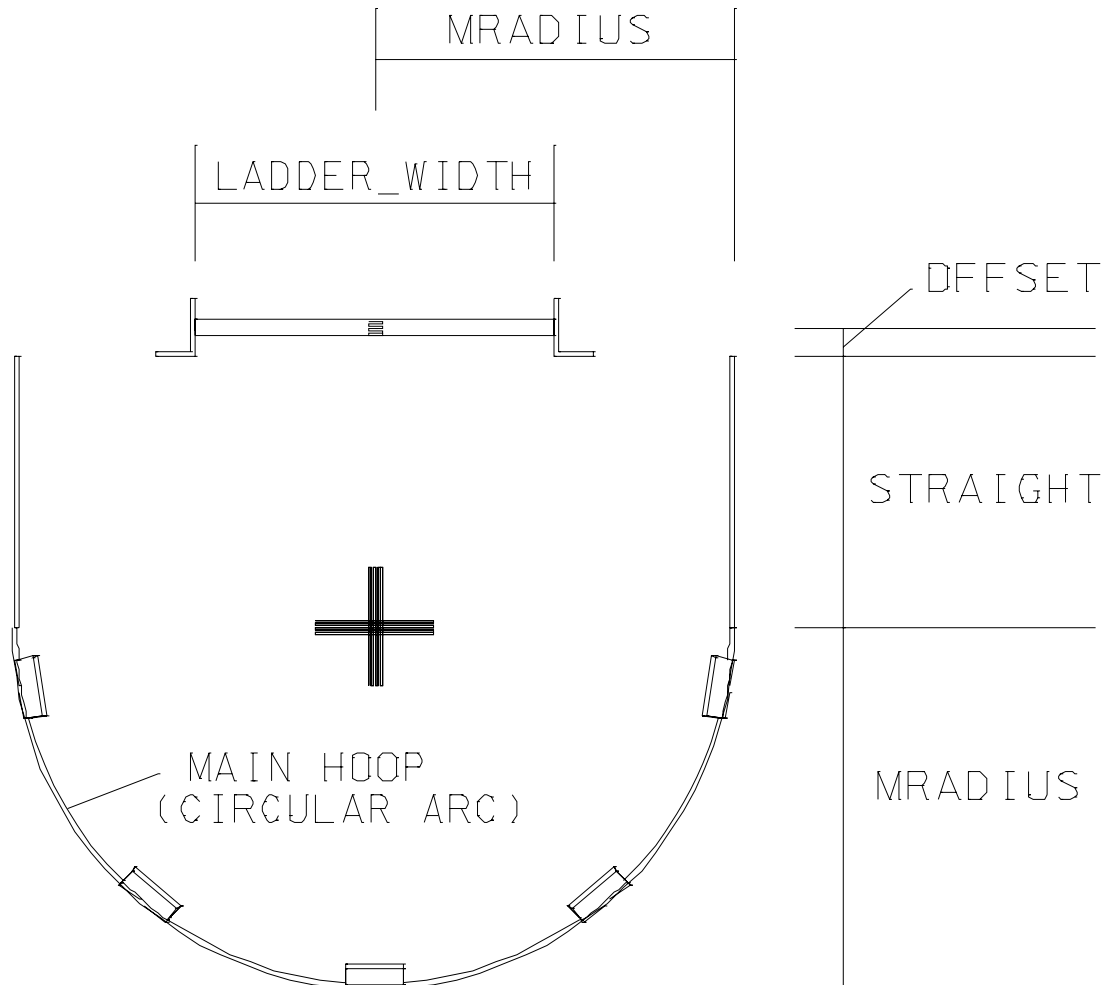


Ladder Base Point (center) and Interior Hoop Dimensions and Main Top Hoop Dimensions

Note that the main top hoop (only the top hoop has section properties of main hoop with dimensions of interior hoop) & the second top interior hoop (interior properties) if placed is placed with CP @ top of hoop, either at CL, inside or outside edge. CP edge setting is controlled by CAGE/iCageCP variable in DEF file.). Thus the IRADIUS dimension shown above is to the CP of the hoop stee – all hoop CP's are at center, outside or inside – only vertical location varies. Interior landing hoops (if present) have dimensions and section properties of the interior hoop. Base interior landing hoops are placed with CP @ top of hoop, either at CL, inside or outside edge. Top landing hoops are placed with CP @ base of hoop, either at CL, inside or outside edge. Interior landing hoops & interior hoops are placed with CP @ midpoint of hoop, either at CL, inside or outside edge.

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Hoop shown below is the default (original hoop). Optional hoop type Cage B is shown on pages 13, 14 & 15.

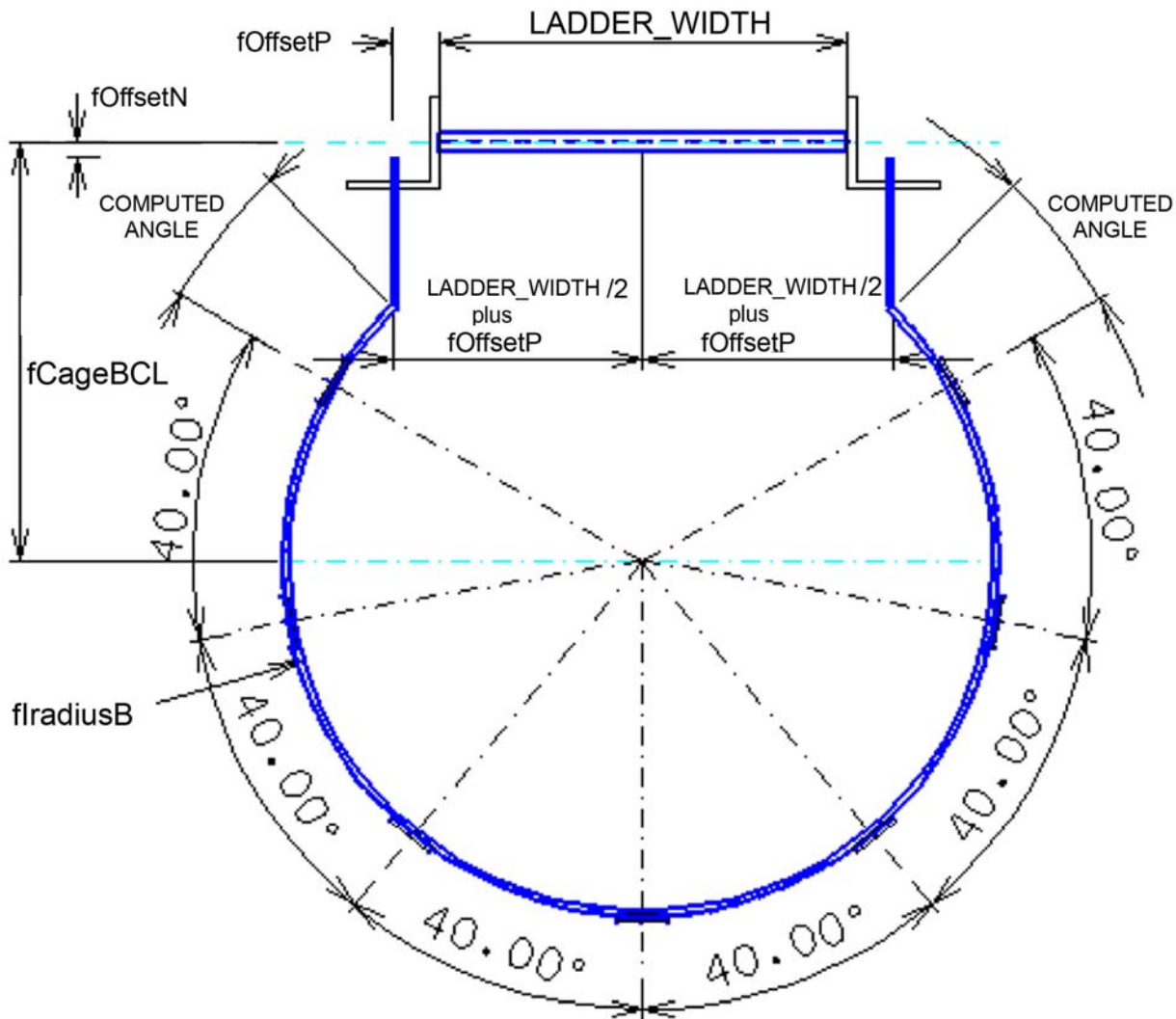


Ladder Dimensions (width) and Main Base Hoop Dimensions

Note that the main base hoop is placed with CP @ base of hoop, either at CL, inside or outside edge. CP edge setting is controlled by CAGE/iCageCP variable in DEF file. Thus the MRADIUS dimension shown above is to the CP line of the hoop steel. ALL hoops are placed with same lateral CP (i.e. centerline, outside edge or inside edge) – only the vertical locations of CP varies depending upon hoop type.

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(Optional Hoop Cage Type – Cage B)



Cage B Interior Hoops

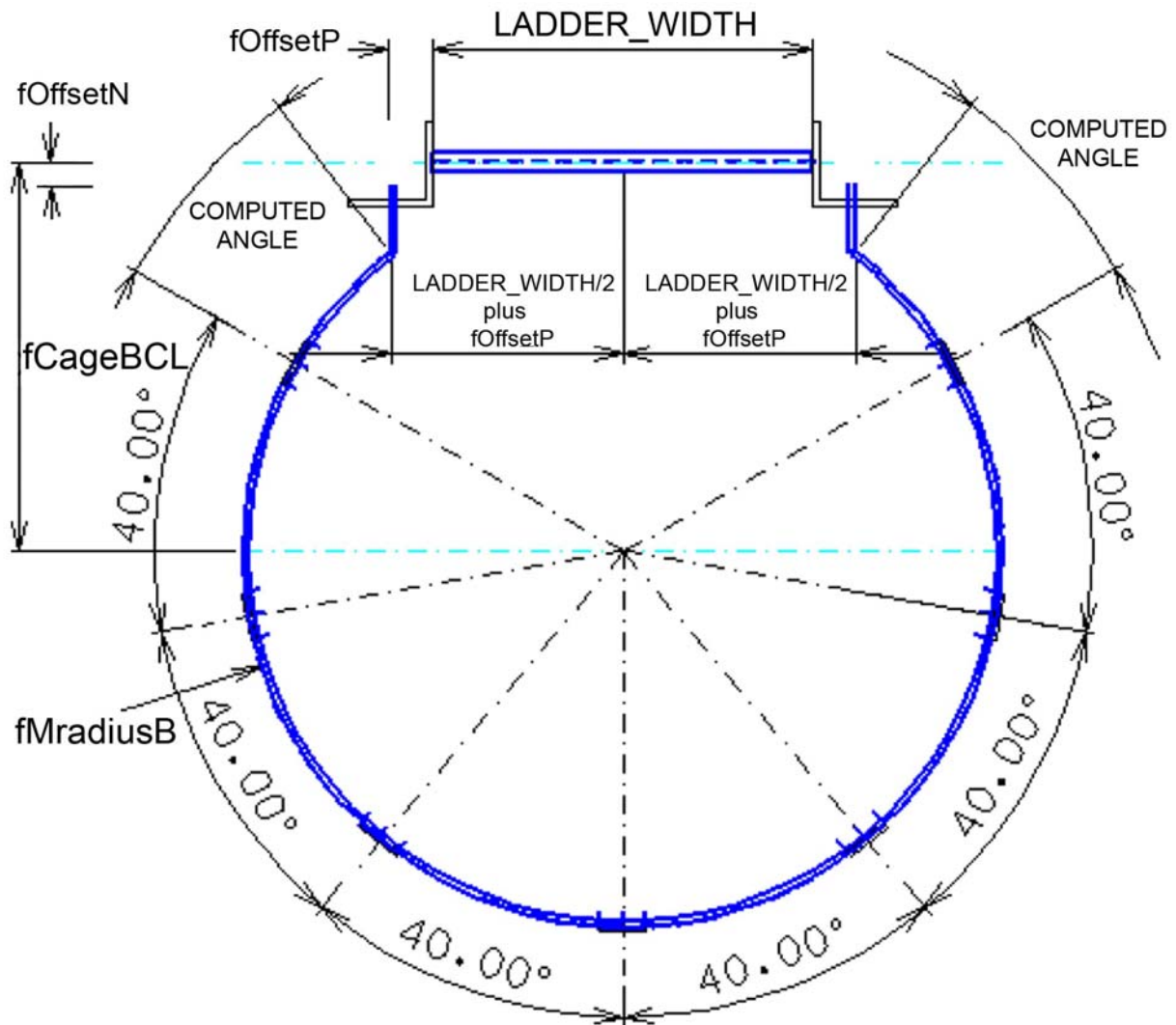
(Top Hoops for Step through ladders)

Notes:

- If fOffsetP is set to zero, 1/2 of rail width is utilized
- For Cage CP location see page 11

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(Optional Hoop Cage Type – Cage B)



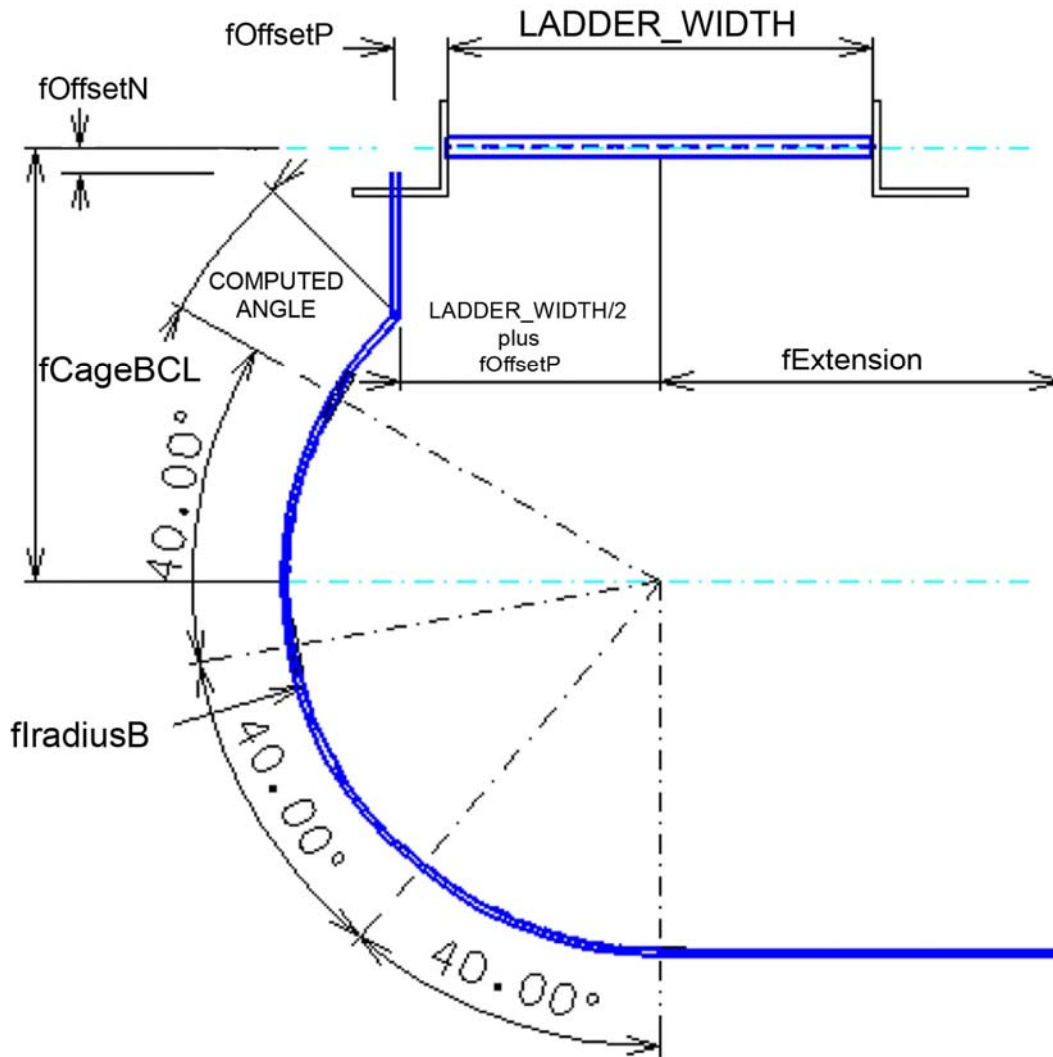
Cage B Bottom (Main) Hoop

Notes:

- If $fOffsetP$ is set to zero, $\frac{1}{2}$ of rail width is utilized
- For Cage CP location see page 12

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(Optional Hoop Cage Type – Cage B)



Cage B Side Step Top Hoop

(Landing Hoop for Side Step)

Notes:

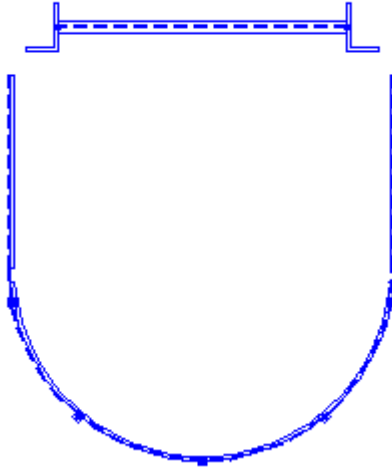
- If **fOffsetP** is set to zero, $\frac{1}{2}$ of rail width is utilized
- For Cage CP location see page 11

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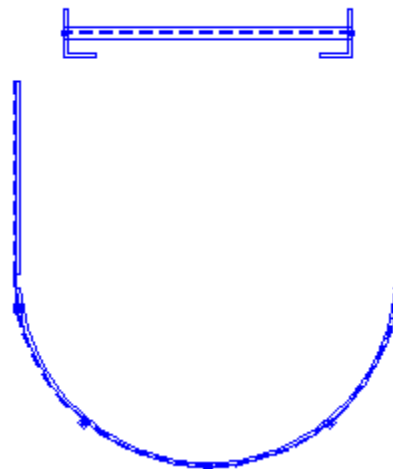
Rail Orientation Options

The vast majority of rails are angle profiles and which are orientated with the flanges forward and the toes pointing away from ladder (this is the default orientation). Other rail configurations are supported and can be controlled with the RORI command in the definitions file.

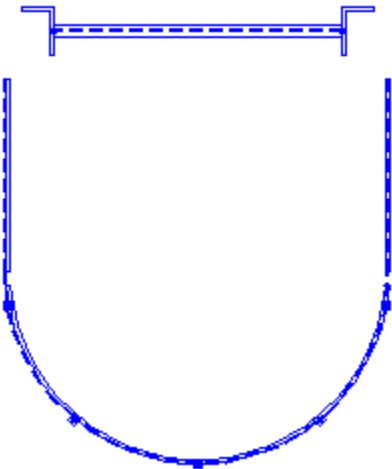
Angle Rail Orientations Options:



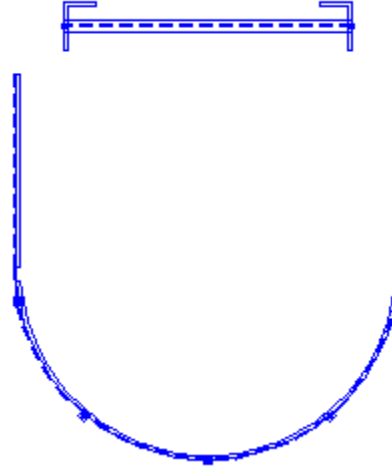
iAngleOrientation = 0
Flanges Forward -Toes Outward
Default



iAngleOrientation = 1
Flanges Forward -Toes Inward



iAngleOrientation = 2
Flanges Rear -Toes Outward



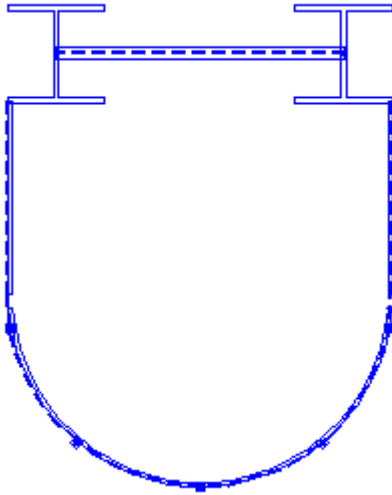
iAngleOrientation = 3
Flanges Rear -Toes Inward

Note that for toe inward orientations (1 & 3), the rung passes through the angle web. Ladder width should be increased to get desired clear ladder width.

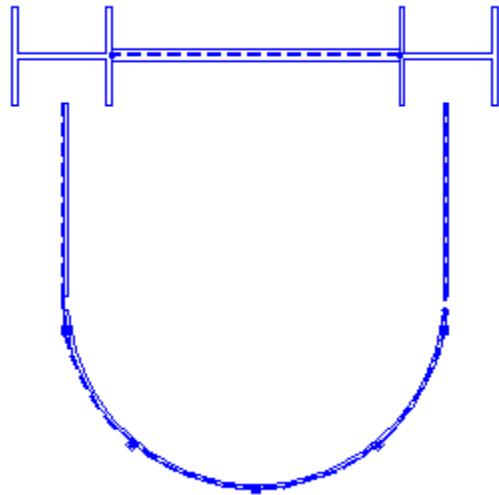
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Rail Orientation Options (con'd)

WF, S & I Rail Orientations:



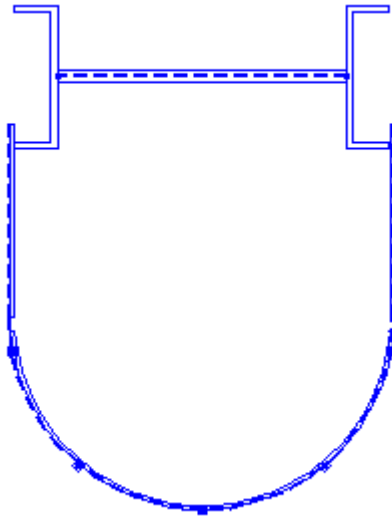
iWFOrientation = 0
Ladder bends about strong axis
Default



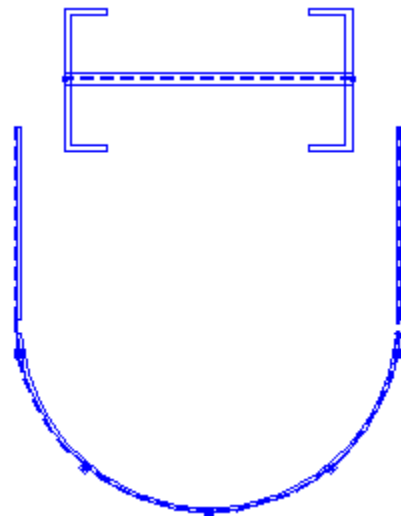
iWFOrientation = 1
Ladder bends about weak axis

Note that for weak axis bending orientation (1), the rung passes through the WF web. Ladder width should be increased to get desired clear ladder width.

Channel Rail Orientations:



iChannelOrientation = 0
Ladder bends about strong axis toes outward
Default



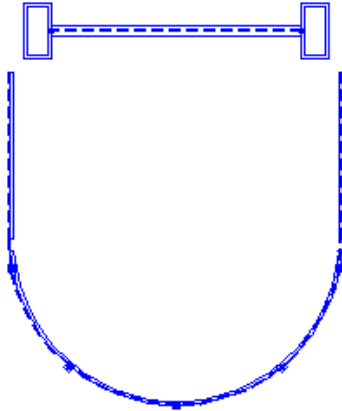
iChannelOrientation = 1
Ladder bends about weak axis toes inward

Note that for toe inward orientation (1), the rung passes through the channel web. Ladder width should be increased to get desired clear ladder width.

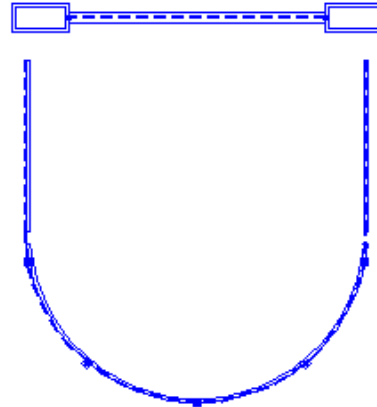
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Rail Orientation Options (con'd)

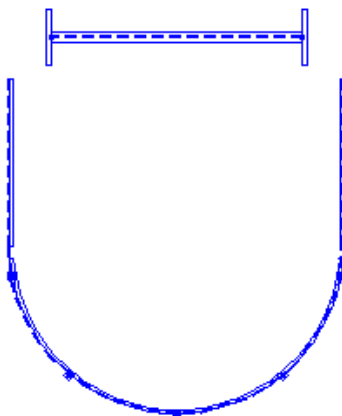
Tube & Solid Bar Rail Orientations:



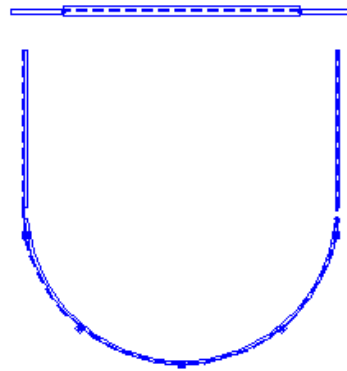
iTubeBarOrientation = 0
Ladder bends about strong axis
Default



iTubeBarOrientation = 1
Ladder bends about weak axis

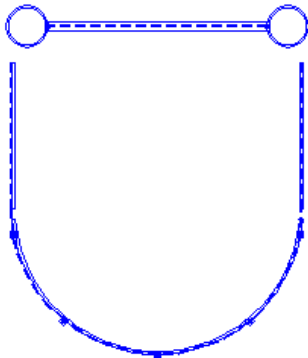


iTubeBarOrientation = 0
Ladder bends about strong axis
Default

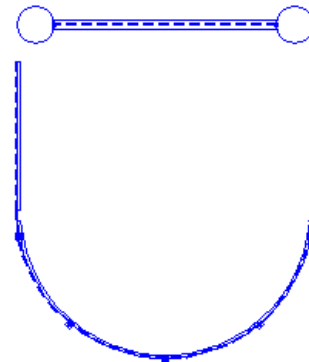


iTubeBarOrientation = 1
Ladder bends about weak axis

Pipe & Solid Round Bar Rail Orientations:



Pipe – Only Orientation



Solid Round – Only Orientation

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Definitions File

Due to the dissimilar nature of the variables in the steel utilities, each steel utility has a separate definition (DEF) file. While each file is distinctly different, each file is similar in the basic method of definition. Each definition file may optionally be controlled with either of two environment variables. Thus a project specific definition file for each project may be easily specified. The environment variables may be specified in numerous ways (similar to any MicroStation variable), however the utilization of a project.pcf is highly recommended. Environment variable definition is discussed in detail in the installation notes provided with the ACE FrameWorks utilities. The default name and location for the definition file for this utility are: C:\ACE_CL.DEF. A directory for the definition file may be specified with the environment variable ACE_DEF_PATH (will look in specified path for file ACE_CL.DEF). A complete name and location of a definition file may be also specified with the environment variable ACE_CL_DEF. The first valid definition file found is utilized. The search for a definition file happens in the following order or priority:

1. If the variable ACE_CL_DEF is specified, the named file at this location will be used if found.
2. If the variable ACE_DEF_PATH is specified and ACE_CL.DEF is found in this directory, it is used.
3. If there is a c:\ace_cl.def file it is utilized.
4. If none of the above, internal program defaults are utilized – a warning message will be displayed.

(if environment variables in 1 and/or 2 above are specified and corresponding DEF file is not found, a warning is displayed) The figures provided on the previous pages will hopefully clarify any confusion with the variables.

Due to the complex nature of the variables, the steel definition files allow the specification of units (either Metric (meter or mm) or English (feet or inch)). Thus a given default file may be utilized in either a Metric or English project. The units may be changed throughout the definition file. If units are not specified, it is assumed that the definition file units match the units of the model. If units are defined and they do not match the model, the variables after the units command are converted to match the model units.

Sample Caged Ladder Definition File (All records that start with a blank or tab are comments)

```
UNITs English FEET
RISer 1.0 .50 1.50 4 5
LADDer 1.5 21.0 4.0 .1667 1 1 .25 12.0 0.0
CAGE 7.5 4.0 0.5 4.5 .25 1.0 1.0 1.5 0 0.0 0
    CAGB 1.0 1.5 1.25 1.35 0.0 0.0 (optional command)
CAG2 3.5 3.5 3.5 3.5
RUNG SR3/4 4 A36 HB 5
    RUN2 SR3/4 2 A36 HB 5 (optional command)
RAIL L3x2x1/4 5 A42 HB
    RAIV L4x3x3/8 5 A42 HB 10 15 (optional command)
    RAIV L5x3x7/16 5 A42 HB 15 30 (optional command)
    LAND 7.0 1 (optional command)
SUPT SB1/2SQ 6 A36 HB
MHOO SB1/2SQ 7 A36 HB
IHOO SB1/4SQ 8 A36 HB
    INTH 1 4.0 (optional command)
    RORI 0 0 0 0 (optional command)
NAME DYN LDR_202
NGP 1 2 5 0 3 1
ENV 8 ACCESS 2
```

Note that the optional CAG2 command is shown above – see page 25 for description and effect of this optional command. Note that in the above & delivered definition file (ace_cl.def) bar section properties are specified for hoop & support section profiles. Normally flat bars are utilized for hoop & support members. Square bars were specified so that caged ladder application will work “out of the box” when the AISC section library is utilized (delivered libraries do not typically contain flat bars). Most companies create a user section library, which contains flat bars as well as other special sections. The last page of this document describes the library creation procedure.

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File

Command Definition

- Valid Primary Keyword Commands : (UNIT, RISE, CAGE, CAGB, CAG2, LADD, RUNG, RUN2, INTN, RAIL, RAIV, SUPT, MHOO, IHOO, LAND, ENV, NGP, NAME)
- Each record must begin with a valid primary keyword or it is ignored
- All records that start with a blank are considered comments
- The commands/keywords (records) may be placed in any order however the order is significant
- The components of a given command (record) must all be present and in the order shown
- By default application looks for C:\ACE_CL.DEF definition file
- Definition file path may be defined with environment variable ACE__DEF_PATH
- ACE_DEF_PATH=d:\mydir\
(the DEF file ACE_CL.DEF will be looked for in the directory d:\mydir)
- Definition file may be defined with environment variable ACE_CL_DEF
- ACE_CL_DEF = d:\mydir\mydef_file (highest priority definition)
- (the DEF file mydef_file will be looked for in the directory d:\mydir)
- NOTE: Components shown in bold may only be specified in the definitions file
- NOTE: Defaults shown will be in effect if there is no definition file or if value violates allowable range.

UNIT Command - Units Command (optional command)

UNIT {UNITTYPE} {UNIT}

where :

{UNITTYPE} May be ENGLISH (feet) or METRIC (meters).

If units is not specified it is assumed that the units match the current model units.

{UNIT} Must be FEET or INCH for ENGLISH (default feet) or must be METER or MM for METRIC (default meters).
If unit is not specified, it is assumed that the units are feet for English & meters for metric.

RISE Command - Riser Command defines riser values

RISE riser_val riser_min riser_max num_risers

where :

riser_val : The Riser Spacing (rung to rung spacing)
Default = 1.00 ft (.305 M)
Range: 0 ft < riser_val <= 2 ft (.610 M)

riser_min : Minimum Value for the First Riser from Base
Default = 0.50 ft (.152 M)
Range: 0 ft < riser_min <= riser_val

riser_max : Maximum Value for the First Riser from Base
Default = 1.50 ft (.457 M)
Range: riser_min < riser_max <= 4 ft (1.219 M)

num_risers : For a side step ladder the number of rungs above the top step rung
Default = 4
Range: 0 < num_risers <= 10

min_num_risers : Minimum number of rungs from base to the top step rung (i.e. min ladder height)
Minimum ladder height = min_num_risers*riser_val
Default = 4
Range: 2 < min_num_risers <= 10

Special Notes on Riser (rung spacing)

Rungs are placed at riser_val spacing from the top rung (determined by ladder height & coordinate information) to the base of the ladder. In most cases, the distance from the base to the base rung (last rung placed - termed base rung spacing) will not precisely equal riser_val but would be a value less than riser_val. The spacing for the base rung (first step) is compared to the value specified for riser_min. If riser_min is greater than the base rung spacing, the base rung is eliminated. The base spacing is now a value greater than riser_val. This distance is compared to riser_max. If the distance is greater than riser_max, a base rung is placed half way between. This case results in the first two rungs being spaced at a value less than riser_val. If riser_max >= riser_min + riser_val, this situation will never occur. The default parameters are such that this will not occur in default conditions. This behavior can be controlled through the definition file.

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

LADD Command - Ladder Command defines cage values

LADDer *ladder_width ladder_height ladder_ext ladder_ext2 interference ladder_taper envelope_ext envelope_height*

where :

- ladder_width** : The width of the ladder
Default = 1.50 ft (.457 M)
Range: 1 ft (.305 M) <= ladder_width <= 4 ft (1.219 M)
- ladder_height** : The distance from the base to the top step rung
Default = 20.00 ft (6.096 M)
Range: (cage_dis + cage_trans + cage_dis2) < ladder_height < 40 ft (12.192 M)
=> Interactively Changeable (interacts w/ CAGE but is normally changed at runtime)
- ladder_ext** : Distance from rail top to the top step rung (also top rung)
(For step through ladder only)
Default = 4.00 ft (1.219 M)
Range: 0 ft < ladder_ext < 10 ft (3.048 M)
- ladder_ext2** : Distance from rail top to the top rung (not top step rung)
(For side step ladder only)
top step rung location (from rail top) = ladder_ext2 + num_risers*riser_val
(see num_risers & riser_val in RISEr command)
Default = .1666 ft (.0508 M)
Range: 0 ft < ladder_ext2 < 10 ft (3.048 M)
- interference** : Interference Option (0 - off 1 - on)
Default = 0 (i.e. off)
⇔ Interactively Changeable
- ladder_taper** : Ladder Taper Option Option (0 - no taper 1 - taper)
Default = 0 (i.e. no taper)
- envelope_ext** : Interference extension value (uniform increase in envelope size)
Default = 0.0 (i.e. tight fit)
- fNoCageLimit** : Ladder height for which a cage is not placed
Default = 0.0 (see Note 2)
- envelope_height** : Interference envelope height extension from top of ladder rail
Default = 0.0

NOTE: Due to the dependence of ladder_width on iradius,
LADDer should be defined before CAGE

NOTE 2: Placement of a cage is controlled by three things.
If the “Place Ladder with Cage” is toggled off on the primary dialog box, a cage is NOT placed period.

If the ladder_height at placement time is less than fNoCageLimit, a cage is NOT placed.

If the computed ladder_height at placement time (distance from the base to the top step rung) is less than cage_dis + cage_trans or cage_dis + cage_min (provided cage_min is not 0 - see CAGE command), a cage is not placed unless iForceCage is defined as 1. If iForceCage is defined and the ladder_height is greater than or equal to cage_dis and ladder_height is less than cage_dis + cage_min (or cage_tran) a cage with a large diameter base hoop and a small diameter top hoop w/ sloping bars is placed.

It is possible to place a top ladder hoop w/o cage placement – see CAGE command subcommand fTopHoopOn

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

RAIL Command - Rail Command defines rail parameters

- The RAIL is the ladder rails

RAIL *railshape railclass railgrade railtype*

where :

railshape	: The shape for the rail (typically a channel or L or flat bar) (Default = C4x7.25) ⇒ Interactively Changeable Section profile name may be enclosed in quotes If name includes spaces, quotes must be utilized (i.e. "P1 1/2STD")
railclass	: The class for the rail (Default = 8) (0 =< class < 10)
railgrade	: The grade for the rail (Default A36)
railtype	: The member type for the rail (Default HB) (CO, BE, VB, HB)

RORI Command - Rail Orientation Command defines rail orientation for profiles

- The RORI command can be utilized to specify rail orientation for various profile shapes
- The RORI command is OPTIONAL (default settings are shown below)

RORI *iAngleOrientation iWFOrientation iTubeBarOrientation iChannelOrientation*

iAngleOrientation	: defines orientation of Angle profile (type 3) ladder 0 - Flanges forward & point outward from ladder (default) 1 - Flanges forward & point inward from ladder 2 - Flanges rear & point outward from ladder 3 - Flanges rear & point inward from ladder
iWFOrientation	: defines orientation of WF, I or S profile (type 1) ladder 0 - Ladder bends about strong axis (default) 1 - Ladder bends about weak axis
iTubeBarOrientation	: defines orientation of Tube or Bar profile (type 7 or type 8) ladder 0 - Ladder bends about strong axis (default) 1 - Ladder bends about weak axis
iChannelOrientation	: defines orientation of Channel profile (type 2) ladder 0 - Ladder bends about strong axis toe outward from ladder (default) 1 - Ladder bends about strong axis toe inward from ladder

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

CAGE Command - Cage Command defines cage values

**CAGE cage_dis cage_trans cage_dis1 cage_dis2 offset straight iradius mradius iCageCP
cage_min iForceCage fTopHoopOn iCageBars iBarCP**

where :

- cage_dis** : The distance from the base to the start of the cage (Main Base Hoop)
Default = 7.25 ft (2.210 M)
Range: 6 ft (1.829 M) <= cage_dis <= 10 ft (3.048 M)
- cage_trans** : The transition distance from large to small cage diameter
Default = 4.00 ft (1.219 M)
Range: 2 ft (.610 M) <= cage_trans <= 6 ft (1.829 M)
- cage_dis1** : The distance from top of rail to main top cage hoop
Default = 0.50 ft (.152 M)
Range: 0 ft <= cage_dis1 <= 1.25 ft (.381 M)
- cage_dis2** : The distance from top of rail to second cage hoop
Default = 4.50 ft (1.372 M)
Range: cage_dis1 + 3 ft (.914 M) < cage_dis2 <= 6 ft (1.829 M)
- offset** : The normal distance from ladder to hoop bar start (both hoops)
Default = .1666 ft (.0508 M)
Range: 0 ft <= offset <= 1 ft (.3048 M)
- straight** : The straight bar distance of hoop geometry (both hoops)
Default = 1.00 ft (.305 M)
Range: .75 ft (.229 M) <= straight <= 2 ft (.610 M)
- iradius** : The intermediate & main top hoop radius (iradius >= ladder_width)
Default = 1.00 ft (.305 M)
Range: .75 ft (.229 M) <= Iradius <= 4 ft (1.219 M)
- mradius** : The main base hoop radius (mradius >= iradius)
Default = 1.50 ft (.457 M)
Range: .75 ft (.229 M) <= Mradius <= 4 ft (1.219 M)
- iCageCP** : Define Hoop CP
0 – Hoops Placed with CP = 2, 5 or 8 (Default Case center of hoop)
1 – Hoops Placed with CP = 3, 6 or 9 (outside edge of hoop)
2 – Hoops Placed with CP = 1, 4 or 7 (outside edge of hoop)
NOTES:
a. Base Hoop placed with CP of 2 or 3 or 1
b. Top Hoop & second top interior hoops placed with CP of 8 or 9 or 7
c. Interior hoops placed with CP of 4, 5 or 6
d. Hoop above interior landing placed with CP of 2 or 3 or 1
e. Hoops placed between top of & base of landings with CP of 4, 5 or 6
f. Hoop at landing elevation placed with CP of 8 or 9 or 7
g. OV for all hoops is (0,0,1)
- cage_min** : The minimum transition distance from large to small cage diameter (optional variable)
Default = 0.0 ft (0.0 M) – if 0 this variable not utilized
Range: 0 ft (0.0 M) <= cage_trans
If cage_min = 0, a cage WILL NOT be placed if the ladder length is less than cage_dis + cage_trans
If cage_min > 0, a cage WILL NOT be placed if the ladder length is less than cage_dis + cage_min
The optional cage_min variable allows for a variable minimum cage transition distance
- iForceCage** : Force placement of a cage when ladder_height >= cage_dis
0 – Do not force placement (default)
1 – Force Placement
Note: If “Place Ladder with Cage” is toggled off – a cage is NOT placed period.
If ladder_height < fNoCageLimit – a cage is NOT placed period. (see page 21)

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

CAGE Command - Cage Command defines cage values (CONTINUED)

fTopHoopOn : Ladder Height for which there will be a solitary Top Hoop (ladder_height >= fTopHoopOn)
Default = 0.0 (Zero values means a solitary top hoop will not be placed)
Placement of a individual top hoop (hoop w/o cage) is controlled by three things.
If the “Place Ladder with Cage” is toggled off on the primary dialog box, a solitary Top Hoop is NOT placed period.

If a cage is placed, a solitary Top Hoop is
NOT placed period (top hoop is placed with cage in that instance).

If the ladder_height at placement time is less than fTopHoopOn,
a solitary Top Hoop is NOT placed.

ladder_height at placement time = distance from the base to the top step rung

iCageBars : Number of Cage Bars
0 – Place 5 cage bars (default)
1 – Place 7 cage bars

iBarCP : The cardinal point option for the cage bar (Default 0 - CP = 5)
0 - Bars placed with a CP of 5 (default - center of bar)
1 - Bars placed with a CP of 6 (outside of bar)
2 - Bars placed with a CP of 4 (inside of bar)

CAGB Command - Cage Command defines optional Cage B values

CAGB *fIradiusB* *fMradiusB* *fCageBCL* *fExtension* *fOffsetN* *fOffsetP*

where :

fIradiusB : The intermediate & main top hoop radius (iradius >= ladder_width)
Default = 1.00 ft (.305 M)
Range: .75 ft (.229 M) <= Iradius <= 4 ft (1.219 M)

fMradiusB : The main base hoop radius (mradius >= iradius)
Default = 1.50 ft (.457 M)
Range: .75 ft (.229 M) <= Mradius <= 4 ft (1.219 M)

fCageBCL : The normal distance from ladder to hoop bar start (both hoops)
Default = .1666 ft (.0508 M)
Range: 0 ft <= offset <= 1 ft (.3048 M)

fExtension : The straight bar distance of hoop geometry (both hoops)
Default = 1.00 ft (.305 M)
Range: .75 ft (.229 M) <= straight <= 2 ft (.610 M)

fOffsetN : The normal distance from ladder rung CL to start of straight stub bar

fOffsetP : The distance (parallel to rung) from ladder rung end to start of straight stub bar
If 0 is specified, ½ of rail width is utilized

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

CAG2 Command - CAG2 Command defines Top Two Hoop Location (OPTIONAL)

(Optional command - OVERRIDES **cage_dis1** & **cage_dis2** in **CAGE** command if provided)

CAG2 *cage1_disST* *cage2_disST* *cage1_disSS* *cage2_disSS*

where :

cage1_disST : The distance from top step rung to first cage hoop (positive value is up) - step through ladder
Default = NONE - Optional Command

Range: ladder_ext >= cage1_disST (can not extend above rail)

cage2_disST : The distance from top cage hoop to second cage hoop - step through cage
Default = NONE - Optional Command

Range: 1 ft (.305 M) <= cage2_disST <= 8 ft (2.438 M)

cage1_disSS : The distance from top step rung to first cage hoop (positive value is up) - side step ladder
Default = NONE - Optional Command

Range: ladder_ext2 + num_risers*riser_val >= cage1_disSS (can not extend above rail)

cage2_disSS : The distance from top cage hoop to second cage hoop - side step cage
Default = NONE - Optional Command

Range: 1 ft (.305 M) <= cage2_disSS <= 8 ft (2.438 M)

NOTE 1: If one value supplied - all values MUST BE SUPPLIED

NOTE 2: If any value out of range - command ignored

NOTE 3: If cage1_disST = cage2_disST (Second hoop placed at top step rung for step through)

NOTE 4: If cage1_disSS = cage2_disSS (Second hoop placed at top step rung for side step)

This optional command provides an alternate way to specify the location for the top two cage hoops. The first (original method) is with the **cage_dis1** & **cage_dis2** variables in the **CAGE** command. The **CAGE** command variables locate the hoop relative to the top of the ladder rail – the same value is utilized for both step through and side step ladders. The **CAG2** command allows the top hoop to be located relative to the top step rung location (allows easy position to handrail heights). The second hoop is located as a distance from the first hoop to the second hoop. The second hoop can be easily located at the top step rung location by specifying the same value for **cage1_disST** & **cage2_disST** for step through ladders and the same value for **cage1_disSS** & **cage2_disSS** for side step ladders. The **CAG2** command also allows separate specification for step through and side step ladders.

ACE Steel FPL Utilities	ACESEA(c) 1998-2003
GENERAL CAGED LADDER PARAMETERS	
Step Through Ladder of Width: 1.500 with Top Taper	
RISER & LADDER PARAMETERS	
Rail Bottom to Top Step Riser: 21.00	
Distance from Top Step Riser to Ladder Top: 4.000	
Riser Spacing: 1.000 Minimum Number of Risers: 5	
Min & Max Heights of Bottom Riser: 0.500 and 1.500	
Min Ladder Height for Cage: 14.000	
CAGE PARAMETERS	
Distance to Bottom Cage: 7.500	
Cage Transition Distance: 4.000	
Distance from Top Step Rung to Top Cage: 3.500	
Distance between Top & Second Cage: 3.500	
Hoop Values Offset: 0.250 Straight Length: 1.000	
Hoop Radius Interior Hoop: 1.000 Main Hoop: 1.500	
Dynamic naming Active (Default Name - LDR_202)	
<input type="button" value="OK"/>	

Note that when the CAG2 command is successfully processed, the “Show Parameters Button” will produce a dialog box changed as follows. Under the CAGE PARAMETERS the third line will read “Distance from Top Step Run to Top Cage” and the fourth line will read “Distance between Top & Second Cage”. The value displayed will depend upon whether or not the caged ladder is step through or side step. For this case, the top cage hoop will be placed 3.5 ft above the top step rung (a positive value places the hoop above the top step rung).

The dialog box shown on page 2 illustrates the display when a CAG2 command is not provided.

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

RUNG Command - Rung Command defines rung parameters

- The RUNG is the ladder rungs typically round solid bars

RUNG *runshape* *runclass* *rungrade* *runtype* *runCP*

where :

runshape	: The shape for the rung (Default = SR3/4) Section profile name may be enclosed in quotes If name includes spaces, quotes must be utilized (i.e. "P1 1/2STD")
runclass	: The class for the rung (Default = 8) (0 =< class < 10)
rungrade	: The grade for the rung (Default A36)
runtype	: The member type for the rung (Default HB) (CO, BE, VB, HB)
runCP	: The cardinal point for the rung (Default 5 - center/center) (May Optionally be specified as 8 - top/center)

RUN2 Command - RUN2 Command defines rung parameters for ladders w/o cages

- The RUN2 is the ladder rungs for NON-CAGED ladders typically round solid bars w/ CP 5
- RUN2 is an optional command – if not specified RUNG is used

RUN2 *runshape2* *runclass2* *rungrade2* *runtype2* *runCP2*

where :

runshape2	: The shape for the rung (Default = SR3/4) Section profile name may be enclosed in quotes If name includes spaces, quotes must be utilized (i.e. "P1 1/2STD")
Rungclass2	: The class for the rung (Default = 8) (0 =< class < 10)
rungrade2	: The grade for the rung (Default A36)
runtype2	: The member type for the rung (Default HB) (CO, BE, VB, HB)
runCP2	: The cardinal point for the rung (Default 5 - center/center) (May Optionally be specified as 8 - top/center)

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

RAIV Command - Variable Rail Command defines rail based on ladder height

- The variable rail command (RAIV) is new with version x.0.9.
- The RAIV command is an optional command.
- A maximum of 5 RAIV commands may be specified
- RAIV order of specification is very important (studied from 1st to last)
- If specified, RAIV works as follows

At placement time, the RAIV specifications are studied from 1st to last. If the ladder height (base to 1st step rung) is inclusively between fHeightLow & fHeightHigh, that rail profile & properties will be utilized. If a conforming RAIV profile is not found, the RAIL specified profile is utilized.

RAIV *railshape* *railclass* *railgrade* *railtype* *fHeightLow* *fHeightHigh*

where :

railshape[24]	: The shape for the rail (typically a channel or L or flat bar) (NO DEFAULT) Note: quotes must be used if profile name contains spaces
railclass	: The class for the rail (No Default) (0 =< class < 10)
railgrade[24]	: The grade for the rail (No Default)
railtype	: The member type for the rail (No Default) (CO, BE, VB, HB)
fHeightLow	: If the Ladder Height (base to first step rail) is greater than or equal to fHeightLow this rail profile will be used if fHeightHigh condition is also met
fHeightHigh	: If the Ladder Height (base to first step rail) is less than or equal to fHeightHigh this rail profile will be used if fHeightLow condition is also met

INTH Command - INTH Command requests interior hoops & defines spacing

- INTH is an optional command – if not specified there are no additional interior hoops
- If not specified a Intermediate Hoop option toggle box will not appear in the main dialog box
- If specified, Intermediate Hoop option can be turned off via dialog box

INTH *int_hoop* *inth_maxspac*

(Optional command - Intermediate hoops can be placed if command provided)

int_hoop : Intermediate Hoop Option (0 - toggle off 1 - toggle on)
Default = 0 (i.e. toggle off)

inth_maxspac : The maximum spacing between intermediate hoops
Default = 4.00 ft (1.22 M)
Range: 0.5 ft (.1525 M) <= inth_maxspac

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

SUPT Command - Support bar Command defines vertical support bar parameters

- The SUPT is the vertical cage support typically the smallest flat bars

SUPT suptshape suptclass suptgrade suptype

where :

suptshape	: The shape for the cage vertical support bars (Default = SB1/2SQ) Section profile name may be enclosed in quotes If name includes spaces, quotes must be utilized (i.e. "P1 1/2STD")
suptclass	: The class for the cage vertical support bars (Default = 9) (0 =< class < 10)
suptgrade	: The grade for the cage vertical support bars (Default A36)
supttype	: The member type for the cage vertical support bars (Default HB) (CO, BE, VB, HB)

MHOOP Command - Main Hoop Command defines main hoop bar parameters

- The MHOOP is the primary cage hoop at top & bottom of cage - typically largest flat bars

MHOOP hoopshape hoopclass hoopgrade hoopitype

where :

hoopshape	: The shape for the hoop (Default = SB1/2SQ) Section profile name may be enclosed in quotes If name includes spaces, quotes must be utilized (i.e. "P1 1/2STD")
hoopclass	: The class for the hoop (Default = 9) (0 =< class < 10)
hoopgrade	: The grade for the hoop (Default A36)
hoopitype	: The member type for the hoop (Default HB) (CO, BE, VB, HB)

IHOOP Command - Interior Hoop Command defines interior hoop bar parameters

- The IHOOP is all intermediate cage hoops typically smallest flat bars

IHOOP hoopishape hoopiclass hoopigrade hoopitype

where :

hoopishape	: The shape for the intermediate hoop (Default = SB1/4SQ) Section profile name may be enclosed in quotes If name includes spaces, quotes must be utilized (i.e. "P1 1/2STD")
hoopiclass	: The class for the intermediate hoop (Default = 9) (0 =< class < 10)
hoopigrade	: The grade for the intermediate hoop (Default A36)
hoopitype	: The member type for the intermediate hoop (Default HB) (CO, BE, VB, HB)

ENV Command - Envelope Command defines interference envelope parameters

- The interference envelope solids placed if requested

ENV envclass envgrade envmaterial

where :

envclass	: The class for the interference envelope (Default = 9) (0 =< class < 10)
envgrade	: The grade for the interference envelope (Default: Access)
envmaterial	: The material type for the interference envelope (Default 2 (usually Aluminum) (0-steel 1-concrete)

ACE FrameWorks Caged Ladder Documentation

Caged Ladder Definition File (continued)

LAND Command - Landing Command defines interior landing options

- The landing command activates landing capability & defines initial landing parameters

LAND *fLandingHeight* *iLandingHoop*

where :

fLandingHeight : The height for the landing opening
NO DEFAULT- MUST BE DEFINED
=> Interactively Changeable

iLandingHoop : Landing Hoop Option (0 - off 1 - on)
0 - No Additional Hoops
1 - Place Hoop at Landing Levels
2 - Place Hoop above Opening
3 - Place Hoops at Landing Level & above Opening
Default = 0 (i.e. NO Hoops)
=> Interactively Changeable

NGP Command - Named Group Command defines namedgroups

NGP *iNGP_rail* *iNGP_rung* *iNGP_supt* *iNGP_mhoo* *iNGP_ihoo* *iNGP_env*

where

<i>iNGP_rail</i>	: Named group for ladder rail (default -1 which is none)
<i>iNGP_rung</i>	: Named group for ladder rung (default -1 which is none)
<i>iNGP_supt</i>	: Named group for caged ladder support bars (default -1 which is none)
<i>iNGP_mhoo</i>	: Named group for caged ladder main hoop (default -1 which is none)
<i>iNGP_ihoo</i>	: Named group for caged ladder interior hoop (default -1 which is none)
<i>iNGP_env</i>	: Named group for ladder solid envelope (default -1 which is none)

NOTE: Namedgroups are defined globally for a project. The *iNGP_xxx* value is an integer value that corresponds to the index of the global namedgroups. The first namedgroup is 0, the next is 1 and so on up to a maximum integer value of the number of namedgroups minus one. If a name group does not exist for the integer value specified, the member type in question will simply not be placed in a named group. A value of -1 specifies that the member type in question is not to be put in a namedgroup. In FWP namedgroups are specified by an alpha name so be careful when selecting integers. **SOLID NAMEDGROUPS ARE FUNCTIONAL with FWP version 7.0.0.17 and later**

NAME Command - Name Command defines caged ladder naming

NAME {*NAME_OPTION*} *name_prefix*

where :

{ <i>NAME_OPTION</i> }	: Keyword - must be AUT or DYN or SPE or CON
AUTo	: FrameWorks assigns names by type and sequence number (<i>name_prefix</i> not required or utilized)
DYNamic	: At placement time will display the last name(prefix) used with following options 1) option to supply new name/prefix 2) option to append the member ID for first rung placed Thus each caged ladder can have a unique name However all components of a given caged ladder will have same name 3) option to abort placement of caged ladder
SPEcified	: Use the supplied name and append the member ID for first rung placed Thus each ladder will have a different name However all components of a given ladder will have same name
CONstant	: Use this name for all ladders placed for all components

NOTE : The default for name is SPE w/ *name_prefix* = LADDER
=> If DYN option - Interactively Changeable Options

ACE FrameWorks Caged Ladder Documentation

User Library Creation for Flat Bars

This section shows how to create a user library, which will contain a flat bar named “FLTBAR” which will have dimensions of 3 in by ¼ inch. A library named MyLib is created and used for this purpose.

Step 1: Create MyLib

If company already has a user library, skip this step. A new library can be created using the FrameWorks Manager option “create section table”. This should be done from the project directory (the directory below ESL). Any name can be given to the user section table. In this case two files will be created in the ESL directory: MyLib.dat & MyLib.idx. Be sure to match model units to table units or you will get inappropriate section sizes with ACE utilities. (i.e. use INCHES w/ English and MM w/ Metric this is true with all FWP versions prior to FWP 7.1.x.x – for FWP 7.1.x.x and later mixed library & project units is permitted).

Step 2: Attach the User Library

If user library already attached, skip this step. From FrameWorks Menu “File option”, select “Section Library”. Select attach and then select your library (MyLib.dat) and then press OK.

Step 3: Create Flat Bar section “FLTBAR”

From FrameWorks Menu “Utilities option”, select “Section/Create”. The following dialog box will appear:

Dialog Box for User Section Creation

Creation of “FLTBAR” section

Select the solid bar shape as shown above on the right. Key in the width and depth as shown and press the create button. The shape will be placed in the user section library. After this is done, revise definition file and use the named flat bar (in this case FLTBAR) for the support bar and hoop section profiles. Of course different section names can be created for the support bar, interior and main hoops if desired. Note that specifying a depth of 3 inches and a width of .25 inches will create a vertical bar, which is normally the desired orientation.

ACE FrameWorks Caged Ladder Documentation

LOG FILES

All applications can write log files if the environment variable ACE_DUMP is set to 1. There have been reports that some sites lock the C root drive and under certain conditions a locked C drive can cause a system fault 5.

All applications have been modified to warn of a locked drive/file and then gracefully exit. All applications now look for the environment variable ACE_LOG_PATH. If it is found, that is the directory where the log files will be placed. If the directory is locked or non-existent or if file is locked a warning will be given and the C drive will be tried. If it is locked or the file is locked a warning will be given and application will gracefully exit.

Usage of the variable ACE_LOG_PATH to control log file locations is similar to ACE_DEF_PATH to control DEF files. However there is one very important difference: ACE_LOG_PATH should NEVER point to a network drive (this is highly recommended for ACE_DEF_PATH). Everyone writes to the same named log file and if they are on a network drive there will be bad consequences. ALWAYS point ACE_LOG_PATH to a local drive (perhaps a temp off C root).