



Pipe supports
Finding the type and settings in
Rohr2 for supports from

Lisega
&
SSG-standard

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1. Disclaimer

The objective of this document is to provide guidelines on how to model various supports, including information on settings in Rohr2.

The user of the ROHR2 piping software is responsible for model setup, selection of pipe supports and to check the validity of calculated results.

The information in this document may be obsolete or change at any time without notice and it is up to the user of the Rohr2 piping software to carefully read the update notes included with each program update or revision.

2. Trademarks

Liseqa is the trademark of Liseqa SE, Gerhard-Liesegang-Straße 1, 27404 Zeven, Germany (www.liseqa.de)

SSG is the trademark of the SSG Standard Solutions Group, Skönsbergsvägen 3, 856 41 Sundsvall, Sweden (www.ssgsolutions.com)

Rörklammerfabriken is a manufacturer of pipe supports following the SSG standard.

Address:

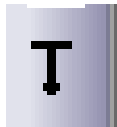
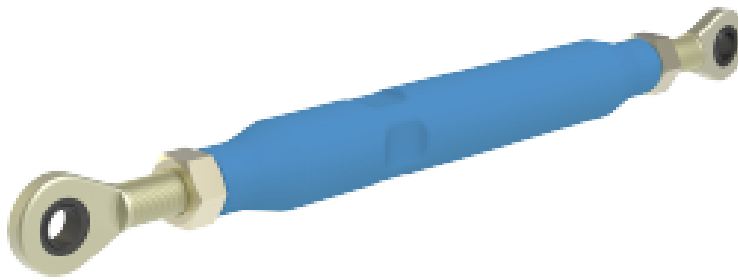
Rörklammerfabriken AB, Box 31, 241 21 Eslöv, Sweden, www.rorklammerfabriken.se

3. Figures used in this document

Pictures showing Liseqa components are taken from the Liseqa product catalogue and are shown with courtesy of Liseqa SE.

Pictures showing SSG components are taken from the webpage of Rörklammerfabriken AB with courtesy of SSG Standard Solutions Group and Rörklammerfabriken AB.

4. Lisega rigid link



Rigid hanger

- Is working in vertical direction only
- Carries load in both tension and compression
- “internal hanger option” allows for connection to other existing beam- or pipe structures in the analysis model
- Axial stiffness may be given
- Bending moments and torques are not restrained.
 1. PX, PY and PZ= free
- Length must be entered if angular deviation is wanted
 1. The maximum angulation of the support rod from the vertical shall be 4° (according to EN 13480)
- Mass of component may be input
- Allowable load may be input



Angulating support, Rigid support

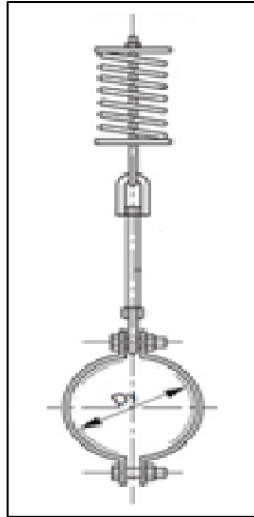
- Is working in any direction
 - Specify “special coordinate system” when the support is not aligned with the global Cartesian coordinate system
- Carries load in both tension and compression
- “internal support option” allows connection to other existing beam or pipe structures in analysis model
- Axial stiffness may be given
- Bending moments and torques are not restrained.
 - PX, PY and PZ= free
- Length must be entered if angular deviation is wanted.
- Mass of component may be input
- Allowable load may be input

5. Spring hanger, Lisega and SSG type 4

Lisega spring hanger



Spring hanger SSG type 4



Rohr2 menus:



Spring hanger

- Is working in vertical direction only
- “Internal hanger” option allows connection to other existing beam or pipe structures in model
- Bending moments and torques are not restrained
 1. PX, PY and PZ= free
- Automatic design according to spring manufacturer design rules is default.
 1. Data from existing hangers may be specified
- Length must be entered if angular deviation is wanted.
 1. The maximum angulation of the hanger from the vertical shall be 4° (according to EN 13480)
- Friction is only considered in nonlinear analysis
- Mass of component may be input
- Design allows for:
 1. selection of different brand of hanger.
 2. User defined installation load
 3. User may select hanger type from catalogue

6. Spring Support, Lisega

Lisega spring support:



Rohr2 menus:



Spring support

- Is working in vertical direction and provides options for lateral and axial restraints.
 1. Gap and friction may be entered
- “Internal support” option allows connection to other existing beam or pipe structures in analysis model
- Bending moments and torques are not restrained.
 1. PX, PY and PZ= free
- Automatic design according to spring manufacturer design rules is default.
 1. Data from existing supports may be specified
- Friction is only considered in nonlinear analysis
- Mass of component may be input
- Design allows for:
 1. Selection of different brand of spring support
 2. User defined installation load
 3. User may select hanger type from catalogue

Node 15

Spring support

Segment: 15 - 9 [Block] [Deactivate]

external support internal support

Coordinate system
 spec. coordinate system [Edit coordinate system]

Spring design
Consider with automatic design
[Design] Spring rate (res.) 1 N/mm
Installation load (res.) 0 kN

Additional bearings
 guide support axial stop WX WY WZ
Stiffness of rigid bearings
[Edit stiffness] Default

Friction, gap
[Edit data] Gap: vert.=0.0 mm
 μ : 0.300

Add. support mass 0 kg

Spring type []
Description []
 insert multiple

[OK] [Cancel] [Apply] [Help]

Settings design

Manufacturer Standard LISEGA 2015

Design Standard

Number 1 2

Selection of the type
 automatically give type user defined
[] show all types

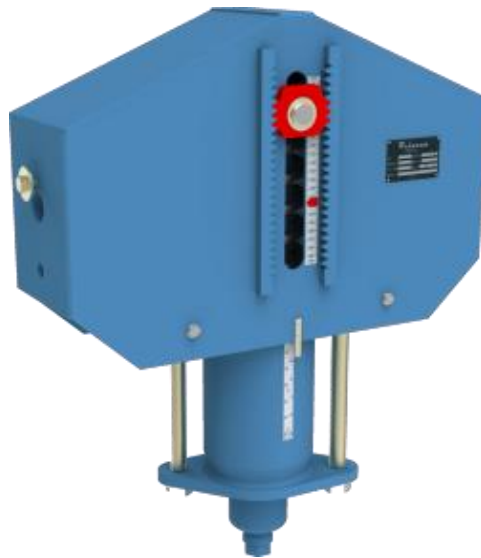
Installation load
 automatically give load no load

Calculation data
Spring rate (res.) 1 N/mm
Installation load (res.) 0 kN

[OK] [Cancel]

7. Constant hanger, Lisega

Lisega constant hanger



Rohr2 menus:



Constant hanger

- Is working in vertical direction only providing a constant lifting force at any vertical movement
- “Internal hanger” option allows connection to other existing beam or pipe structures in analysis model
- Bending moments and torques are not restrained.
 1. PX, PY and PZ= free
- Automatic design according to hanger manufacturer design rules is default.
 1. Data from existing hangers may be specified
- Length must be entered if angular deviation is wanted.
 1. The maximum angulation of the hanger from the vertical shall be 4° (according to EN 13480)
- Friction is only considered in nonlinear analysis
- Mass of component may be input
- Design allows for:
 1. selection of different brand of hanger.
 2. User defined installation load
 3. User may select hanger type from catalogue

Node 15

Constant hanger

Segment: 15 - 9 [Block] [Deactivate]

external hanger internal hanger

Design

Consider with automatic design

[Design] Installation load (res.) 0 kN

Consider angular deviation Hanger length [] mm

Consider friction Friction coefficient 0

Add. support mass 0 kg

Hanger type []

Description []

insert multiple

[OK] [Cancel] [Apply] [Help]

Settings design

Manufacturer Standard LISEGA 2015

Design Standard

Number 1 2

Selection of the type

automatically give type user defined

[] show all types

Installation load

automatically give load no load

Calculation data

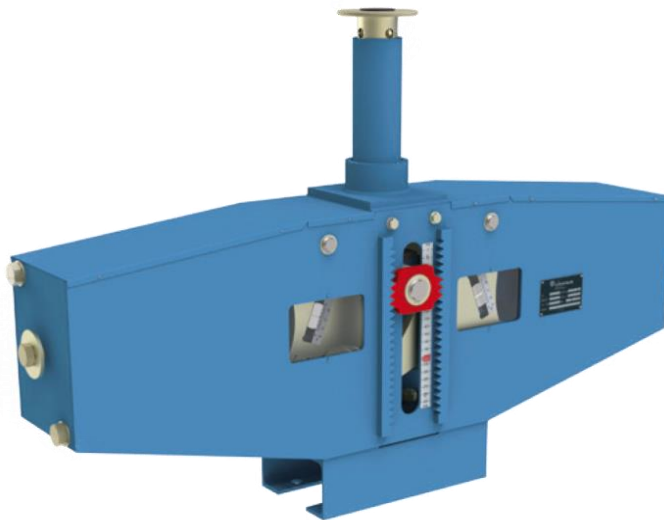
Spring rate (res.) 0.001 N/mm

Installation load (res.) 0 kN

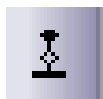
[OK] [Cancel]

8. Constant Support, Lisega

Lisega constant support:

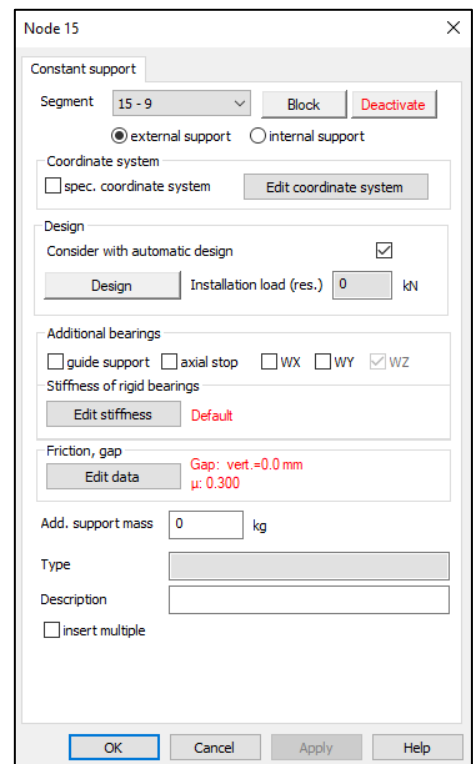


Rohr2 menus:



Constant support

- Is working in vertical direction and provides options for lateral and axial restraints.
 1. Gap and friction may be entered
- “Internal support” option allows connection to other existing beam or pipe structures in analysis model
- Bending moments and torques are not restrained.
 1. PX, PY and PZ= free
- Automatic design according to hanger manufacturer design rules is default.
 1. Data from existing hangers may be specified
- Friction is only considered in nonlinear analysis
- Mass of component may be input
- Design allows for:
 1. selection of different brand of hanger.
 2. User defined installation load
 3. User may select hanger type from catalogue



Node 15

Constant support

Segment: 15 - 9 [Block] [Deactivate]

external support internal support

Coordinate system
 spec. coordinate system [Edit coordinate system]

Design
Consider with automatic design
[Design] Installation load (res.) 0 kN

Additional bearings
 guide support axial stop WX WY WZ
Stiffness of rigid bearings
[Edit stiffness] Default

Friction, gap
[Edit data] Gap: vert.=0.0 mm
 μ : 0.300

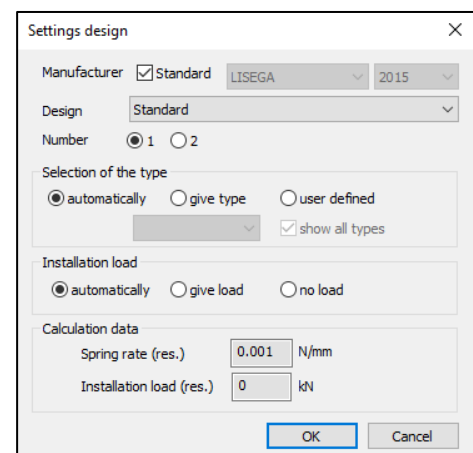
Add. support mass 0 kg

Type

Description

insert multiple

[OK] [Cancel] [Apply] [Help]



Settings design

Manufacturer Standard LISEGA 2015

Design Standard

Number 1 2

Selection of the type
 automatically give type user defined
[] show all types

Installation load
 automatically give load no load

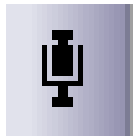
Calculation data
Spring rate (res.) 0.001 N/mm
Installation load (res.) 0 kN

[OK] [Cancel]

9. Lisega Shock absorber

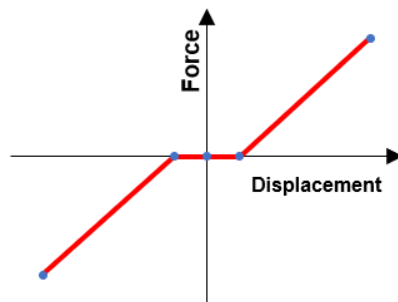


Rohr2 menus:



Shock absorber

- Component is active in dynamic analysis only. The shock absorber allows slow thermal movements within a specified range but restricts fast movements due to fast dynamic events.
 1. Eigenfrequency analysis: Only the stiffnesses for both system and spring rate is considered
 2. Linear dynamics: Same as for eigenfrequency analysis
 3. Transient fully integrated analysis: all features are considered: gaps (backlash effect including impact), friction and viscous effect.



- Direction of action is specified by user.
- Carries load in both tension and compression.
- “Is connected to the system node”, allows connection to other existing beam or pipe structures in model.
- Bending moments and torques are not restrained
 1. PX, PY and PZ= free
- The shock absorber has no mass

Node 69

Shock absorber

Base point

Is connected to the system: node

Is considered as an anchor point, directional vector:

X mm Y mm Z mm

Distance between shock absorber and base point: mm

Shock absorber parameter

Gap negative mm Gap positive mm

Constant resistance inside the gap kN

Spring rate of system N/mm

Plastification load kN

Description

insert multiple

Shock absorber parameter

Name of data

Description

Constant resistance (Visco. response range) kN

velocity proportional resistance (Visco range) kNs/m

Response behavior

none Velocity Acceleration

Reaction rate mm/s

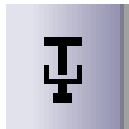
Spring rate (response range) kN/m

Impact coefficient

10. Lisega Damper



Rohr2 menu:



Damper

- Component is active in dynamic analysis only. The damper allows slow thermal movements but restricts fast movements due to fast dynamic events.
 1. Eigenfrequency analysis: Only the stiffness for spring rate is considered.
 2. Linear dynamics: Same as for eigenfrequency analysis.
 3. Transient fully integrated analysis: all features are considered: Stiffness and viscous effect.
- Spring rates and viscous damping may be specified for all six degrees of freedom (translations & rotations).
 1. User defined coordinate system is available.
 2. Connects to ground only.
- Carries load in both positive and negative direction.
- The mass of the damper may be given.

Node 69

Damper

Segment 79 - 69

spec. coordinate system [Edit coordinate system](#)

Spring rates

CWX = 0	N/mm	CPX = 0	Nm/deg
CWY = 0	N/mm	CPY = 0	Nm/deg
CWZ = 500	N/mm	CPZ = 0	Nm/deg

Velocity proportional resistance (Direct integration)

RWX = 0	kNs/m	RPX = 0	kNms/rad
RWY = 0	kNs/m	RPY = 0	kNms/rad
RWZ = 0	kNs/m	RPZ = 0	kNms/rad

Add. support mass 13 kg

Description

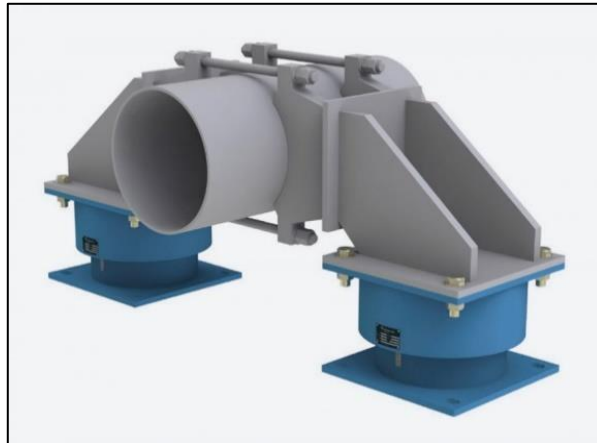
insert multiple

OK Cancel Apply Help

Comment:

The damper is a simpler component compared to the shock absorber from where most advanced features has been eliminated.

11. Liseqa Visco Damper



Rohr2 menu:



Visco damper

- Component is active in dynamic analysis only. The damper allows slow thermal movements but restricts fast movements due to fast dynamic events.
 1. Eigenfrequency analysis: Only the stiffness for spring rate is considered.
 2. Linear dynamics: Same as for eigenfrequency analysis but stiffness may be based on critical eigenfrequency value.
 3. Transient fully integrated analysis: all features are considered: Stiffness and viscous effects.
- Bending moments and torques are not restrained.
 1. PX, PY and PZ= free.
- Carries load in both positive and negative direction in horizontal and vertical directions simultaneously.
- The main advantage of the visco damper that there is no play/gap in the connection to the piping. This means that the visco damper also prevents small movements.
- Database of visco dampers is from the manufacturer Gerb
- The mass of the damper may be given.

Node 41

Visco damper

Base point

Is connected to the system: node

Is considered as an anchor point, directional vector:

X mm Y mm Z mm

Properties of auxiliary member

Distance between visco damper and base point: mm

Damper parameters

User defined

Parameter	C	B
Horz. lin...	535.30 kN/m	17.442 kNs/m
Horz. lin...	790.40 kN/m	6.858 kNs/m
Vert. line 1	484.80 kN/m	21.759 kNs/m

Frequencies for calculation of equivalent stiffness

horizontal Hz vertical Hz

For load cases of the type "harmonic excitation" use the excitation frequency for the determination of the equivalent stiffness

Mass stamp kg

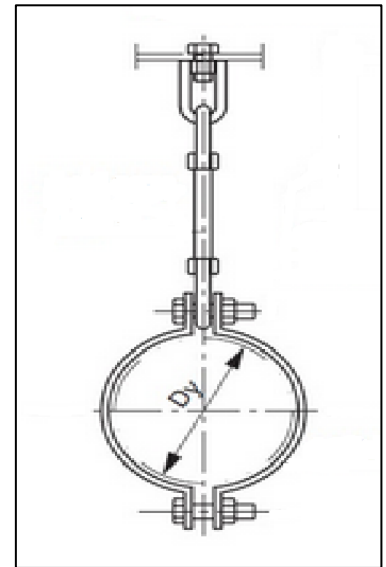
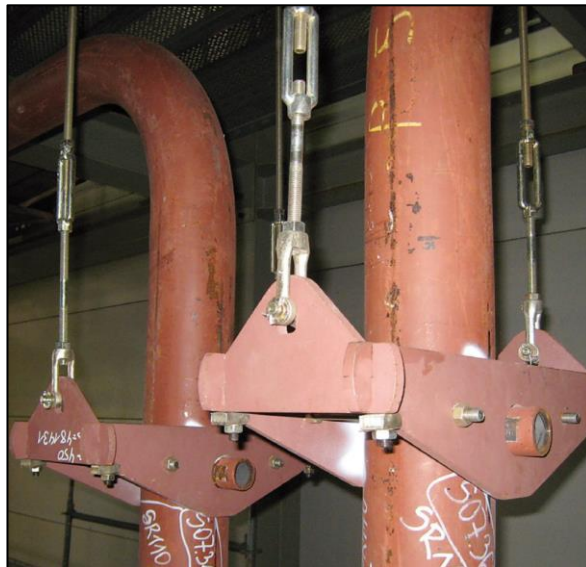
Mass case kg

Type

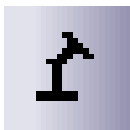
Description

insert multiple

12. Lisega Rod support, SSG type 1, 2 & 3



Rohr2 menus:



Lisega Rod support

- The support may be modelled in multiple ways:
 - Rigid support, sliding support. The most easy way to model a rod support in a static structural analysis.

- Set coefficient of friction to $\mu = 0.001$

Friction coefficients

simplified input complete input

simplified input

Gap

Horizontal: 999.9 mm Upward: 999.9 mm

Friction coefficient μ : 0.001

complete input

	Gap neg. mm	Gap pos. mm	Friction coefficients		Resistance in the area of gap kN
Bearing in Xa	999.9	999.9	$\mu WY = 0.3$	$\mu WZ = 0.3$	RWX= 0
Bearing in Ya	999.9	999.9	$\mu WX = 0.3$	$\mu WZ = 0.3$	RWY= 0
Bearing in Za	0	999.9	$\mu WX = 0.3$	$\mu WY = 0.3$	RWZ= 0

consider no friction and gap

- Active in vertical direction only, all other translations and rotations are free (PX, PY and PZ= free).

Node 15

Rigid support

15 - 9

external support internal support

Coordinate system

spec. coordinate system

Support type

Sliding support Rotation stop Xi (Torsion)

Guide Rotation stop Yi

Axial stop Rotation stop Zi

Anchor Lift off protection

Components

WX WY WZ PX PY PZ

Friction, gap

Gap: vert.=999.9 mm μ : 0.300

Stiffness

Default

Add. support mass 0 kg

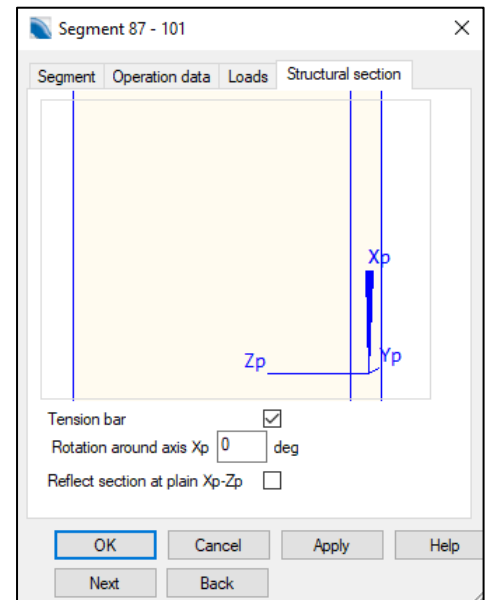
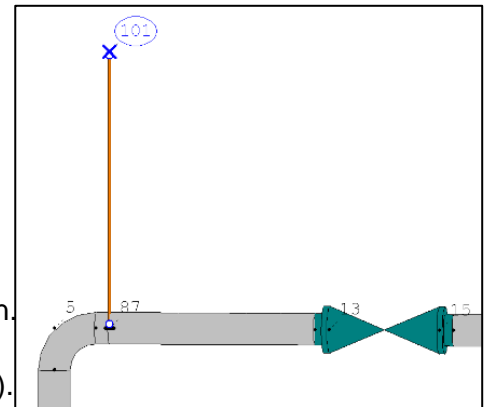
Description

insert multiple

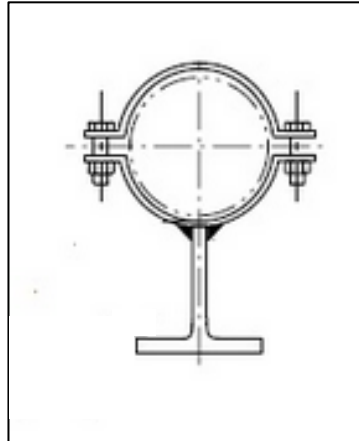
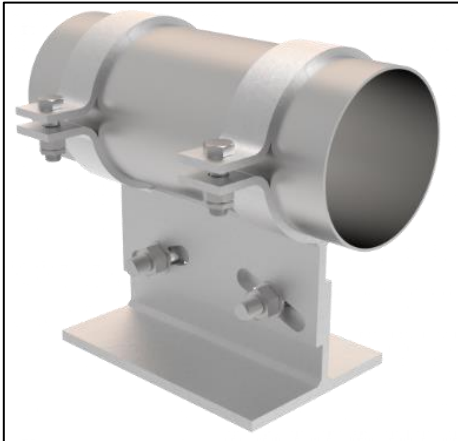
Lisege Rod support and SSG type 1, 2 & 3, continued:

2. Using a rigid element with the option
"Tension bar"

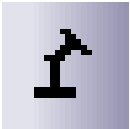
- Require modelling of rigid element, applying anchor at free and setting option "Tension bar".
- Angulation of rod is calculated.
- Carry load in both tension and compression.
 - User must check for upward loads (warning is given at end of analysis).
- All rotations are free (PX, PY and PZ= free)



13. Lisega Sliding shoe, SSG type 11



Rohr2 menus:



Lisega Sliding shoe, SSG type 11

- Rigid support, sliding support.
 1. Active in vertical direction only, all other translations and rotations are free (PX, PY and PZ= free).

Node 15

Rigid support

15 - 9 Deactivate

external support internal support

Coordinate system

spec. coordinate system Edit coordinate system

Support type

Sliding support Rotation stop Xi (Torsion)

Guide Rotation stop Yi

Axial stop Rotation stop Zi

Anchor Lift off protection

Components

WX WY WZ PX PY PZ

Friction, gap

Edit data Gap: vert.=999.9 mm
μ: 0.300

Stiffness

Edit stiffness Default

Standard Save type in data base

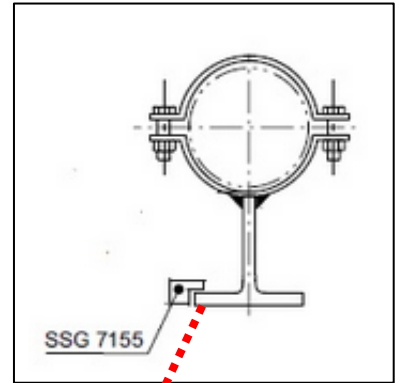
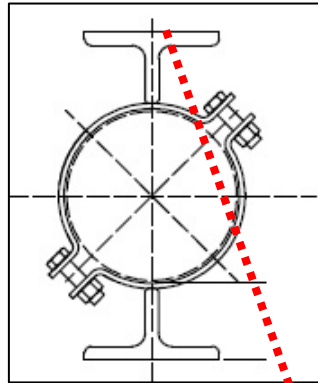
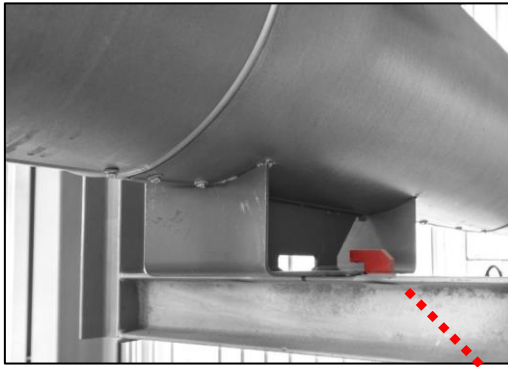
Add. support mass kg

Description

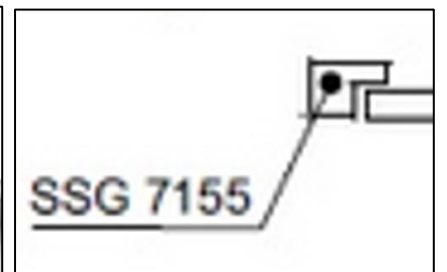
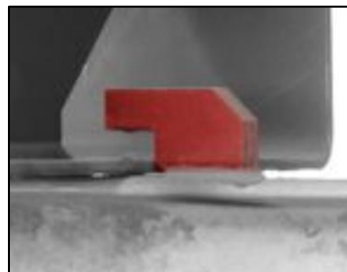
insert multiple Insert allowable loads

OK Cancel Apply Help

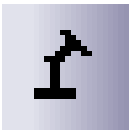
14. Lisega Sliding shoe, SSG type 12 & 13



Lift off protection:



Rohr2 menus:



Lisega Sliding shoe, SSG type 11 & 12

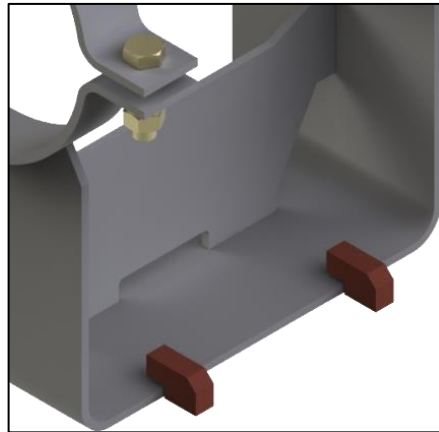
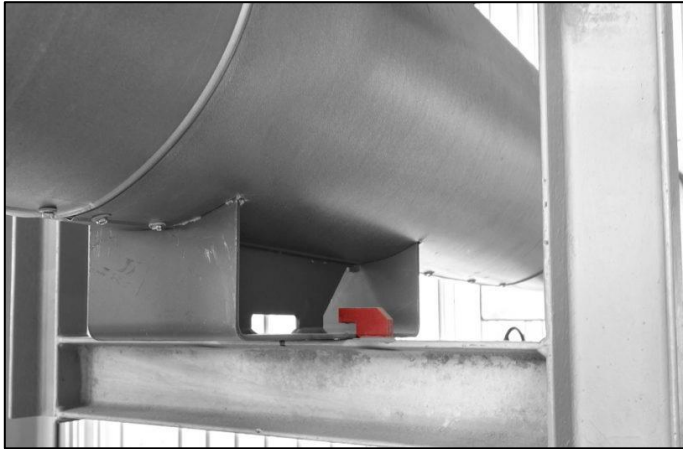
- Rigid support, sliding support.
 1. Active in vertical direction only, all other translations and rotations are free (PX, PY and PZ= free).
 2. Checking the option “Lift off protection” will restrain upward movement. Any gap in upward direction is specified at “Friction, gap” In figures below a gap of 2 mm is defined for upward movement of piping.
 3. Note that the “hook” and SSG 7155 vertical restraint can restrain lateral movement if the lateral movements are large.

Support type	
<input checked="" type="checkbox"/> Sliding support	<input type="checkbox"/> Rotation stop Xi (Torsion)
<input type="checkbox"/> Guide	<input type="checkbox"/> Rotation stop Yi
<input type="checkbox"/> Axial stop	<input type="checkbox"/> Rotation stop Zi
<input type="checkbox"/> Anchor	<input checked="" type="checkbox"/> Lift off protection
Components	
<input type="checkbox"/> WX	<input type="checkbox"/> WY <input checked="" type="checkbox"/> WZ <input type="checkbox"/> PX <input type="checkbox"/> PY <input type="checkbox"/> PZ
Friction, gap	
<input type="button" value="Edit data"/>	Gap: vert.=0.0 mmn μ : 0.300

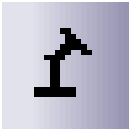
Friction coefficients			
<input type="radio"/> simplified input		<input checked="" type="radio"/> complete input	
Gap			
Horizontal:	999.9 mm	Upward:	0 mm
Friction coefficient μ : 0.3			
complete input			
Bearing in Xa	Gap neg. mm	Gap pos. mm	Resistance in the area of gap kN
	999.9	999.9	μ WY= 0.3 μ WZ= 0.3 RWX= 0
Bearing in Ya	999.9	999.9	μ WX= 0.3 μ WZ= 0.3 RWY= 0
Bearing in Za	0	2	μ WX= 0.3 μ WY= 0.3 RWZ= 0
<input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="checkbox"/> consider no friction and gap			

Node 15	
Rigid support	
15 - 9	<input type="button" value="Deactivate"/>
<input checked="" type="radio"/> external support <input type="radio"/> internal support	
Coordinate system	
<input type="checkbox"/> spec. coordinate system	<input type="button" value="Edit coordinate system"/>
Support type	
<input checked="" type="checkbox"/> Sliding support	<input type="checkbox"/> Rotation stop Xi (Torsion)
<input type="checkbox"/> Guide	<input type="checkbox"/> Rotation stop Yi
<input type="checkbox"/> Axial stop	<input type="checkbox"/> Rotation stop Zi
<input type="checkbox"/> Anchor	<input type="checkbox"/> Lift off protection
Components	
<input type="checkbox"/> WX <input type="checkbox"/> WY <input checked="" type="checkbox"/> WZ <input type="checkbox"/> PX <input type="checkbox"/> PY <input type="checkbox"/> PZ	
Friction, gap	
<input type="button" value="Edit data"/>	Gap: vert.=999.9 mmn μ : 0.300
Stiffness	
<input type="button" value="Edit stiffness"/>	Default
<input type="button" value="Standard"/> <input type="button" value="Save type in data base"/>	
Add. support mass	0 kg
Description	
<input type="checkbox"/> insert multiple	<input type="button" value="Insert allowable loads"/>
<input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Apply"/> <input type="button" value="Help"/>	

15. Lisega Sliding shoe w. guide, SSG type 14 & 15

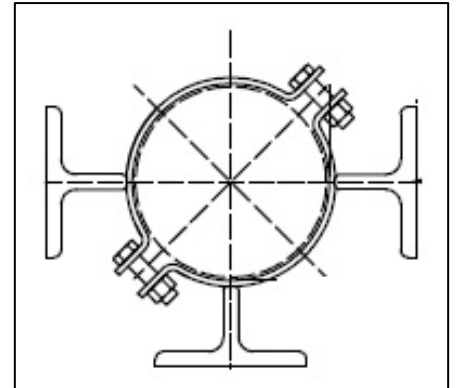


Rohr2 menu:

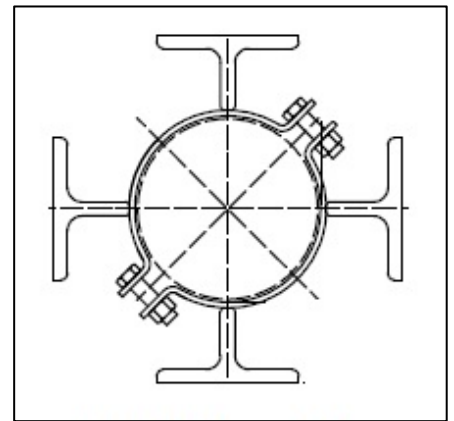


Lisega Sliding shoe, SSG type 14 & 15

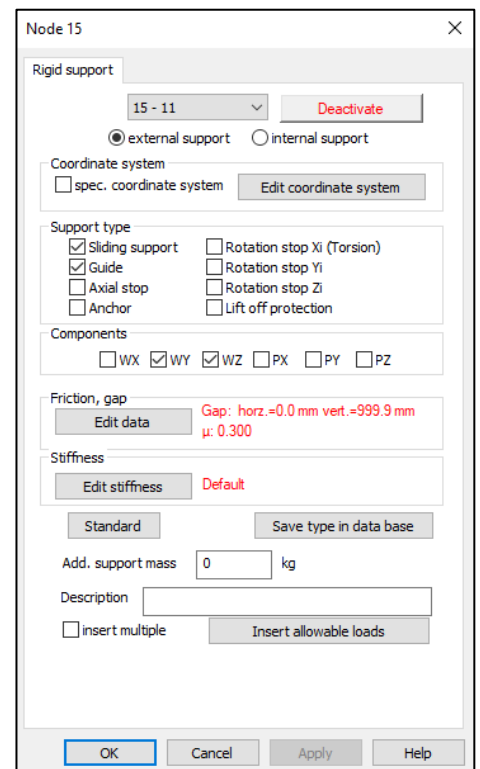
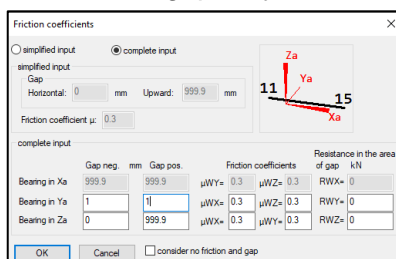
SSG type 14



SSG type 15



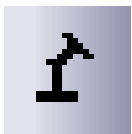
- Rigid support, sliding support + Guide.
 1. Active in vertical and lateral direction only, axial translation and all rotations are free (PX, PY and PZ= free).
 2. Note the following:
 - a. For horizontal pipes both “Sliding support” and “Guide” must be checked
 - b. Checking the option “Lift off protection” will restrain upward movement
 - c. For vertical pipe runs only “Guide” must be checked
 3. Friction and gap may be entered in all directions



16. Lisega roller bearing support



Rohr2 menus:



Lisega roller bearing support

- Rigid support, sliding support
 1. Active in vertical direction but can optionally have “Lift of protection” and lateral support (Guide) included. Axial translation and all rotations are free (PX, PY and PZ= free)
 2. Coefficient of friction must be set to almost zero:

Friction coefficients

simplified input complete input

simplified input

Gap

Horizontal: 999.9 mm Upward: 999.9 mm

Friction coefficient μ : 0.0001

complete input

	Gap neg. mm	Gap pos.	Friction coefficients		Resistance in the area of gap kN
Bearing in Xa	999.9	999.9	$\mu WY=$ 0.000	$\mu WZ=$ 0.000	RWX= 0
Bearing in Ya	999.9	999.9	$\mu WX=$ 0.000	$\mu WZ=$ 0.000	RWY= 0
Bearing in Za	0	999.9	$\mu WX=$ 0.000	$\mu WY=$ 0.000	RWZ= 0

consider no friction and gap

3. Note: Minimum value of coefficient of friction in Rohr2 is $\mu= 1.0 \times 10^{-6}$.

Node 15

Rigid support

15 - 11

external support internal support

Coordinate system

spec. coordinate system

Support type

Sliding support Rotation stop Xi (Torsion)

Guide Rotation stop Yi

Axial stop Rotation stop Zi

Anchor Lift off protection

Components

WX WY WZ PX PY PZ

Friction, gap

 Gap: vert.=999.9 mm
 μ : 0.300

Stiffness

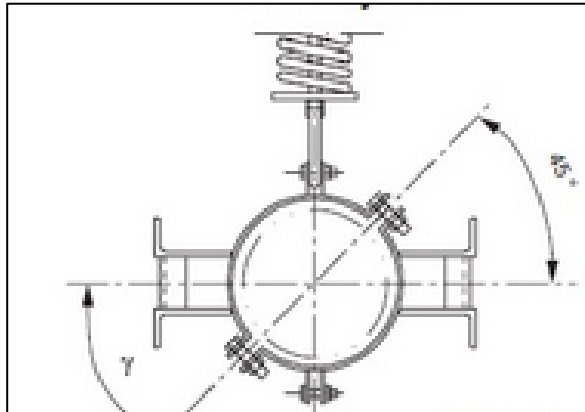
 Default

Add. support mass 0 kg

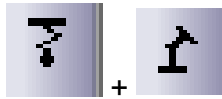
Description Roller bearing support

insert multiple

17. Lateral support & spring, SSG type 17 & 18



Rohr2 menus:



Spring hanger with guide (optional)

In Rohr2 only one type of pipe support can be applied at a node. If multiple types of supports are needed at a single position, a new node point must be created close to an existing node having the different type of support.

The pipe support in top right picture, SSG type 17 – 18 is modelled as follows:

1. Create a spring hanger.
2. Create an additional (rigid) support) close (1 mm) to the existing spring hanger.

Node 15

Spring hanger

Segment: 15 - 11 [Block] [Deactivate]

external hanger internal hanger

Spring design

Consider with automatic design

[Design] Spring rate (res.) 1 N/mm
Installation load (res.) 0 kN

Consider angular deviation Hanger length mm
 Consider friction friction coefficient 0

Add. support mass 0 kg

Spring type
Description

insert multiple

[OK] [Cancel] [Apply] [Help]

Node 83

Rigid support

83 - 17 [Deactivate]

external support internal support

spec. coordinate system [Edit coordinate system]

Support type

Sliding support Rotation stop Xi (Torsion)
 Guide Rotation stop Yi
 Axial stop Rotation stop Zi
 Anchor Lift off protection

Components

WX WY WZ PX PY PZ

Friction, gap

[Edit data] Gap: horz.=0.0 mm
 μ : 0.300

Stiffness

[Edit stiffness] Default

[Standard] [Save type in data base]

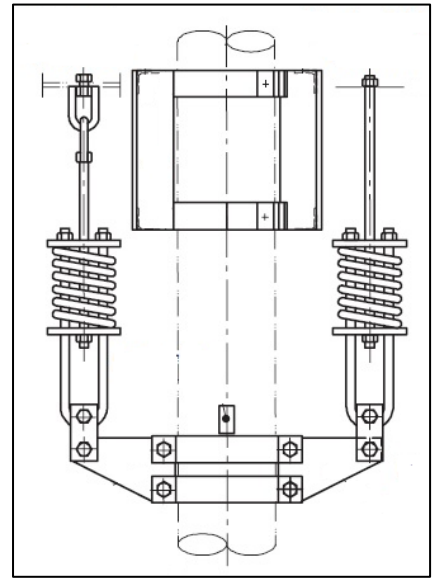
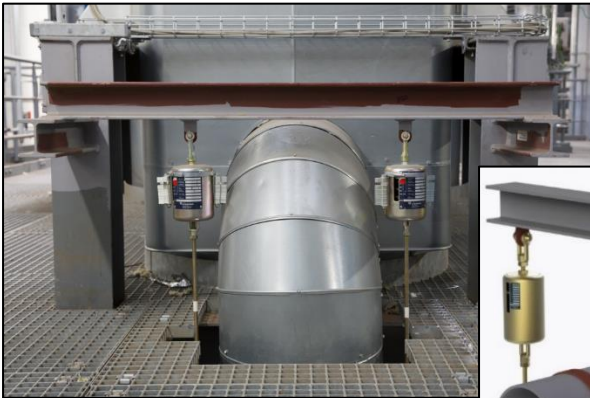
Add. support mass 0 kg

Description

insert multiple [Insert allowable loads]

[OK] [Cancel] [Apply] [Help]

18. Lisega spring support vert. pipe, SSG type 27 - 30



Rohr2 menus:

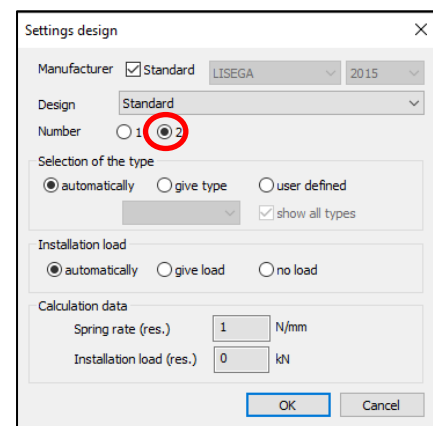
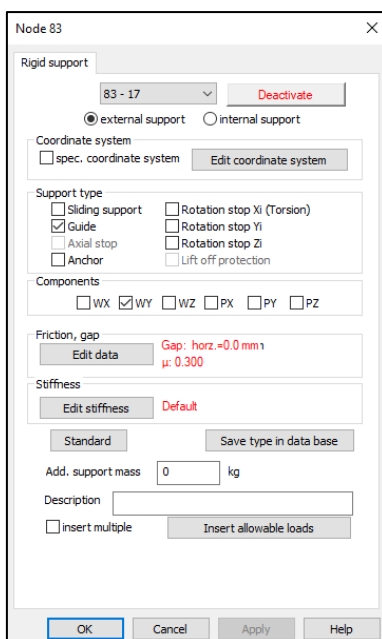
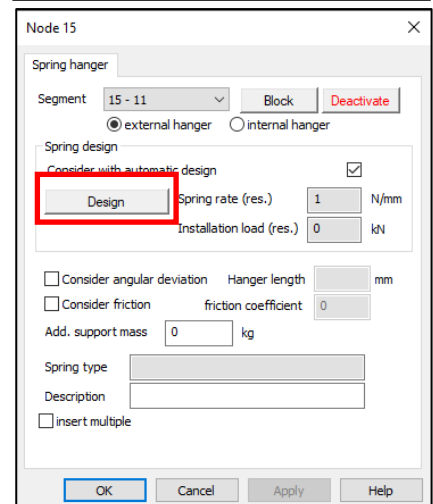


+ Spring hanger with guide (optional)

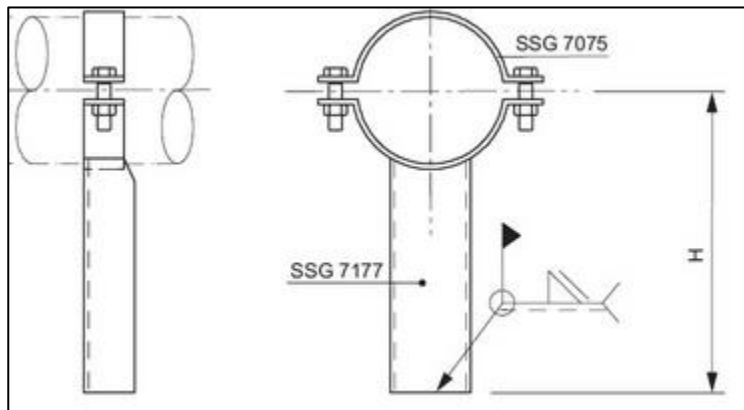
In Rohr2 only one type of pipe support can be applied at a node. If multiple types of supports are needed at a single position, a new node point must be created close to an existing node having the different type of support.

The pipe support in top right picture, SSG type 27 – 30 is modelled as follows:

1. Create a spring hanger using two hangers
2. Create an additional (rigid) support) right above the existing spring hanger



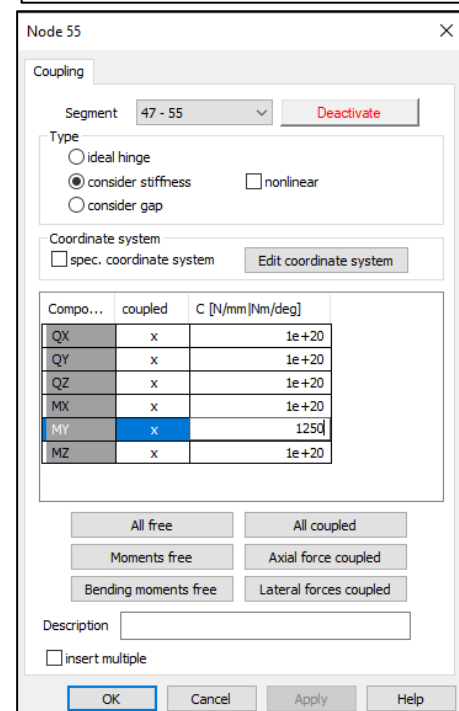
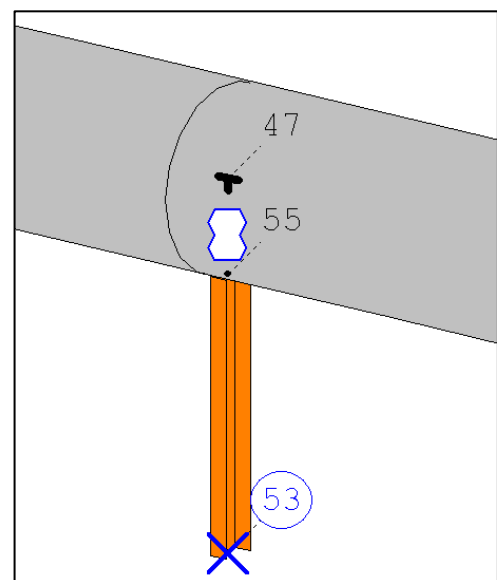
19. Pipe – beam connection, SSG type 31



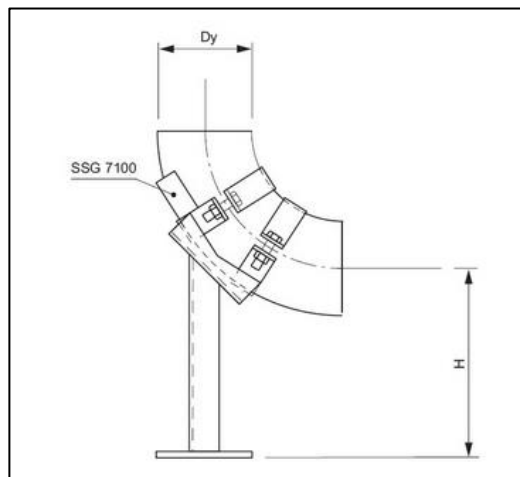
This pipe support is built as a structural beam connecting to the pipe:

Consider the following using this support:

- This support is not intended for large axial forces or displacements. Sliding between pipe clamp is not desired.
- The angulation of pipe must be small. Angle between beam – pipe should be 90°.
- Create a rigid element within the pipe (between node 47 and node 55 in figure) to get correct stiffness of the beam-pipe connection. Otherwise the support will be too flexible.
- Additional flexibility between pipe and beam may be defined using “Coupling”
 - a. Stiffness values must be obtained by other means, for example FE-analysis



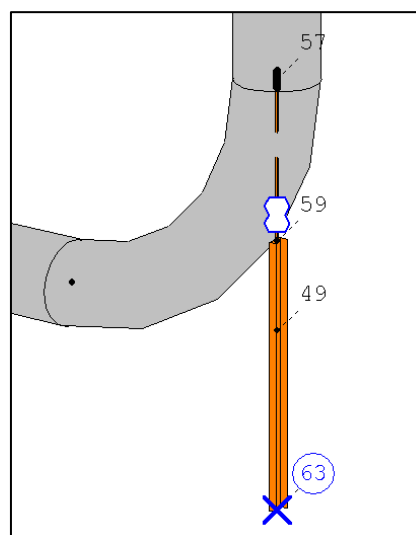
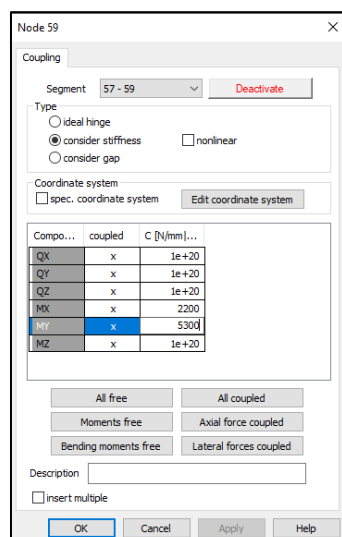
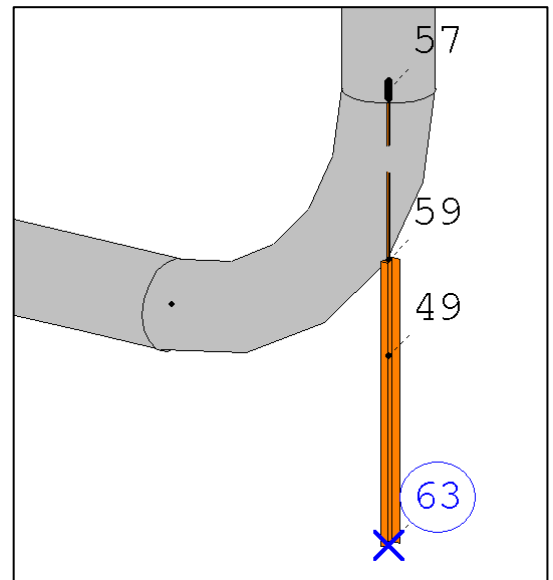
20. Trunnion support, SSG type 32



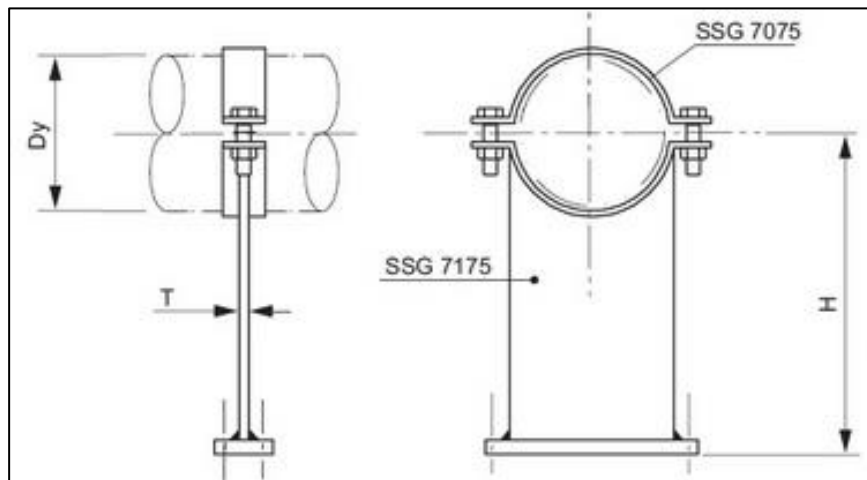
This pipe support is built as a structural beam connecting to the pipe bend:

Consider the following using this support:

- This support is not intended for large horizontal forces or displacements. Sliding between pipe clamp is not allowed.
- The angulation of pipe must be small.
- Create a rigid element within the bend (between node 57 and node 59 in figure) to get correct stiffness of the beam-pipe connection. Otherwise the support will be too flexible.
- Additional flexibility between pipe and beam may be defined using “Coupling”
 - a. Stiffness values must be obtained by other means, for example FE-analysis



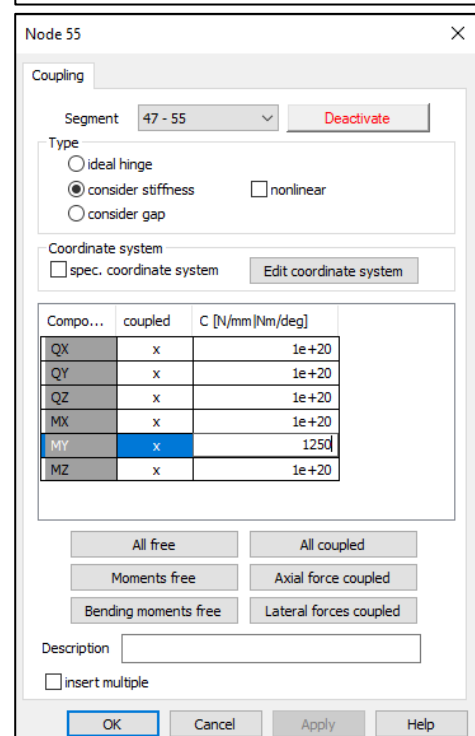
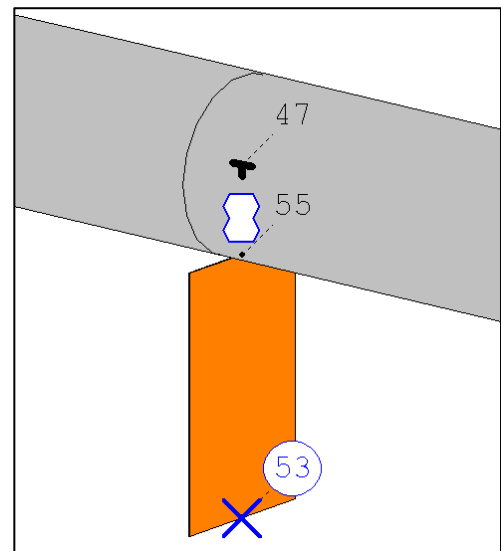
21. Axial flex plate support, SSG type 33 & 34



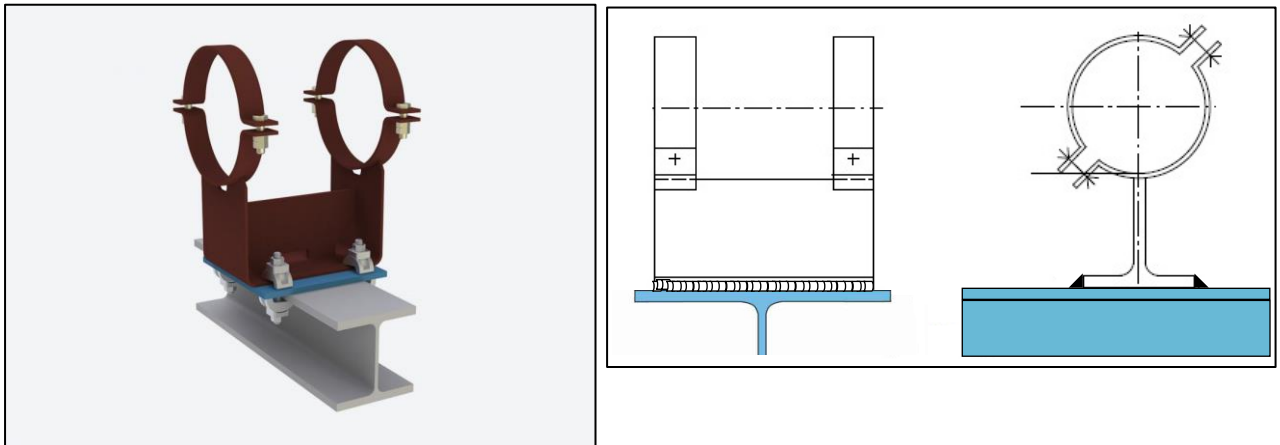
This pipe support is built as a structural beam connecting to the pipe:

Consider the following using this support:

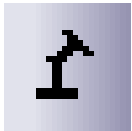
- This support is flexible in axial direction and is stiff in lateral and vertical directions.
- Create a rigid element within the bend (between node 47 and node 55 in figure) to get correct stiffness of the beam-pipe connection. Otherwise the support will be too flexible
- Additional flexibility between pipe and beam may be defined using “Coupling”
 - a. Stiffness values must be obtained by other means, for example FE-analysis



22. Lisega anchor support, SSG type 35 & 36



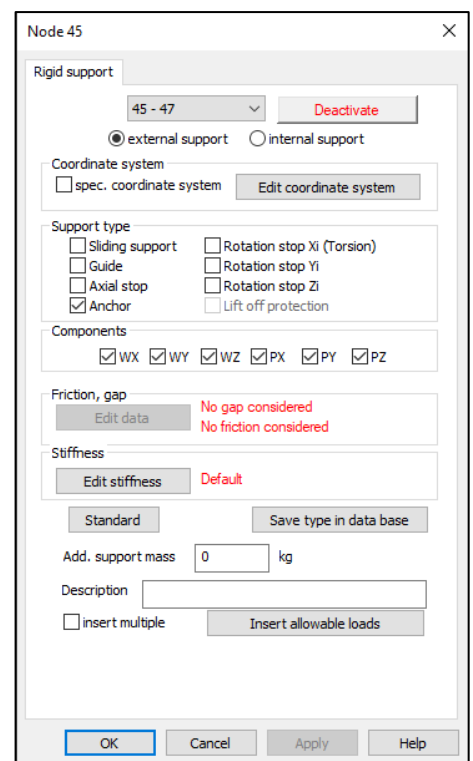
Rohr2 menus:



Lisega anchor support, SSG type 35 & 36

Rigid support, Anchor

1. All translations and rotations are restrained
2. Stiffness values may be specified for all degrees of freedom
3. It is not possible to specify any gaps for any direction or rotation



23. Stiffness values for supports

Within Rohr2, most supports are modelled using node to node contact elements, often called as “gap” elements. For supports where the pipe component may slide on the support or change status from contact to non-contact and vice versa, the equation solver must use an iterative procedure to find a solution. Since a contact problem is a “status” type of non linearity it is sensitive to a numerical difficulty called “chattering”.

Chattering means that the pipe at one iteration is penetrating into the support. In response to this a spring is introduced to push the pipe up to the correct position of the support at the next iteration. If this spring is “to stiff” it might push the pipe away from the support and hence the spring is removed. And this penetration and lift-off will continue until the of allowable number of equilibrium iterations are exhausted and a warning is issued that the accuracy of the solution is not achieved.

For this reason Rohr2 selects a contact stiffness based on material type and pipe dimension at current support to provide better conditions for the equation solver of finding a solution.

Anchor point (virtually infinite stiff):

		X	Y	Z
Displacement [N/mm]		1e+20	1e+20	1e+20
Rotation [Nm/deg]		1e+20	1e+20	1e+20

Sliding support:

		X	Y	Z
Displacement [N/mm]		40000	40000	40000
Rotation [Nm/deg]		0	0	0

In real life the piping supports are not infinite stiff, since they are designed by sheet metal strips with various shapes and dimensions and the support is suspended by secondary steel which also adds additional flexibility. For this reason, Rohr2 provides data bases according to VDI 3842 year 2003 and 2004 release to provide data to real life support structures.

Note that the stiffness values are based on pipe outer diameters.

The pipe supports are divided in three categories, soft, normal and hard.

The secondary steel must be taken into account when choosing the categories of the pipe supports.

		X	Y	Z
Displacement [N/mm]		0	0	0
Rotation [Nm/deg]		0	0	0

Selecting the proper stiffness category requires that the analyst has knowledge about the structures supporting the piping system which is unique for every installation. At the end choosing “Default” value for static structural analysis may be sufficient and a little on the “safe side”. See also:

VDI3842, VDI-RICHTLINIEN, Schwingungen in Rohrleitungssystemen / Vibrations in piping systems, Beuth Verlag GmbH, 107 72 Berlin, 2004