



Tutorial

API ISO Norsok

Updated on: 18 Apr 2023

Tested with: SDC Verifier 2023 R1

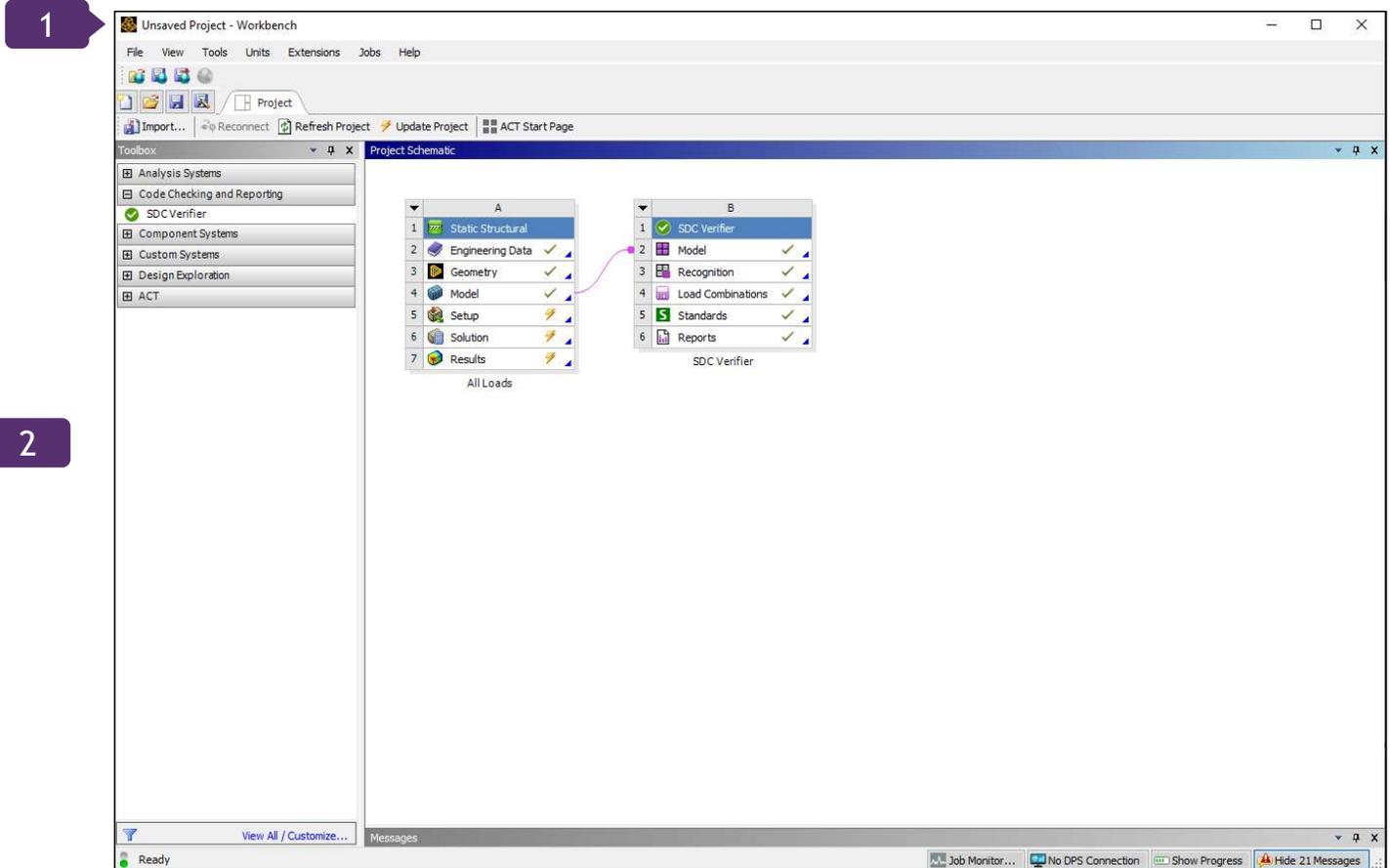
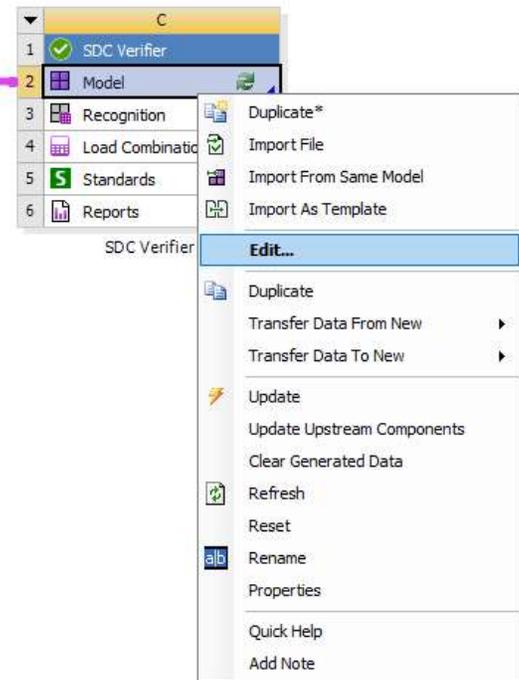
Ansys version 2022

- In this tutorial, API 2A RP/ISO 19902/Norsok N004 Beam Design Checks are reviewed.
- A beam model of a steel frame has been used as a start FEM model.
- Beam member finder was used to recognize beam member length in 3 directions.
- The report was generated with the help of report designer.

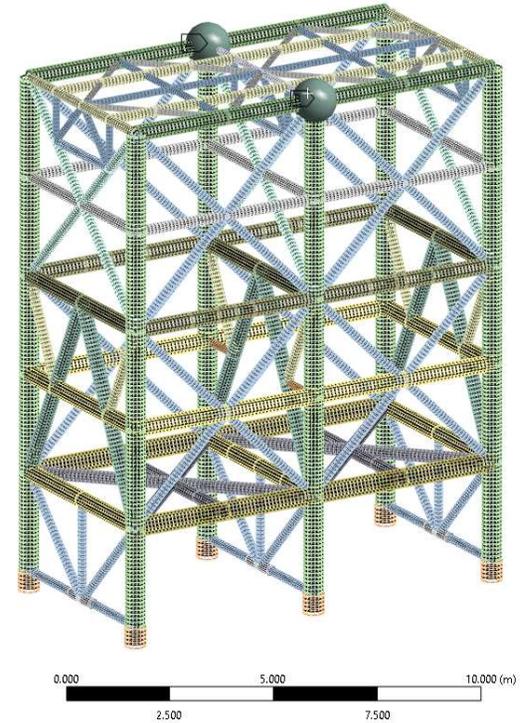
Launch SDC Verifier

1 Open in Ansys **Workbench** **AISC360 and Eurocode3.wbpj**

2 Click on Model or in context menu click **Edit**



- ▶ Views (1)
- ▶ Model
- ▶ Recognition
- ▶ Jobs (1)
 - ▶ 1..Static Structural
 - ▶ Individual Loads (6)
 - 1..Gravity - step #1
 - 2..Force Right - step #2
 - 3..Force Left - step #3
 - 4..Force Down - step #4
 - 5..Force Middle YX - step #5
 - 6..Force Middle -YX - step #6
 - ▶ Load Sets (4)
 - ▶ Load Groups (1)
 - FG Fatigue Groups (0)
 - Tables (0)
 - Plots (0)
- ▶ Tools
- S Standards (0)
- ▶ Post-Processing
- Optimizations (0)
- Reports (0)

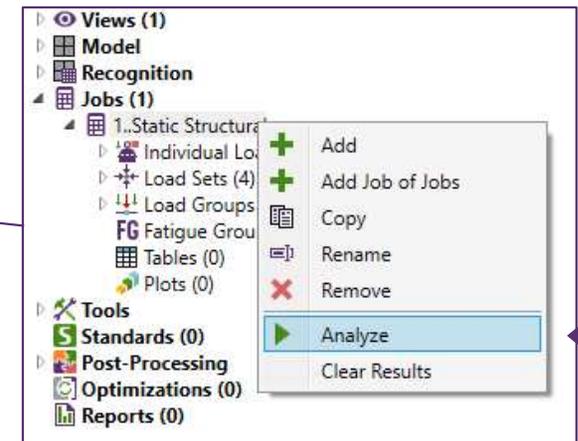
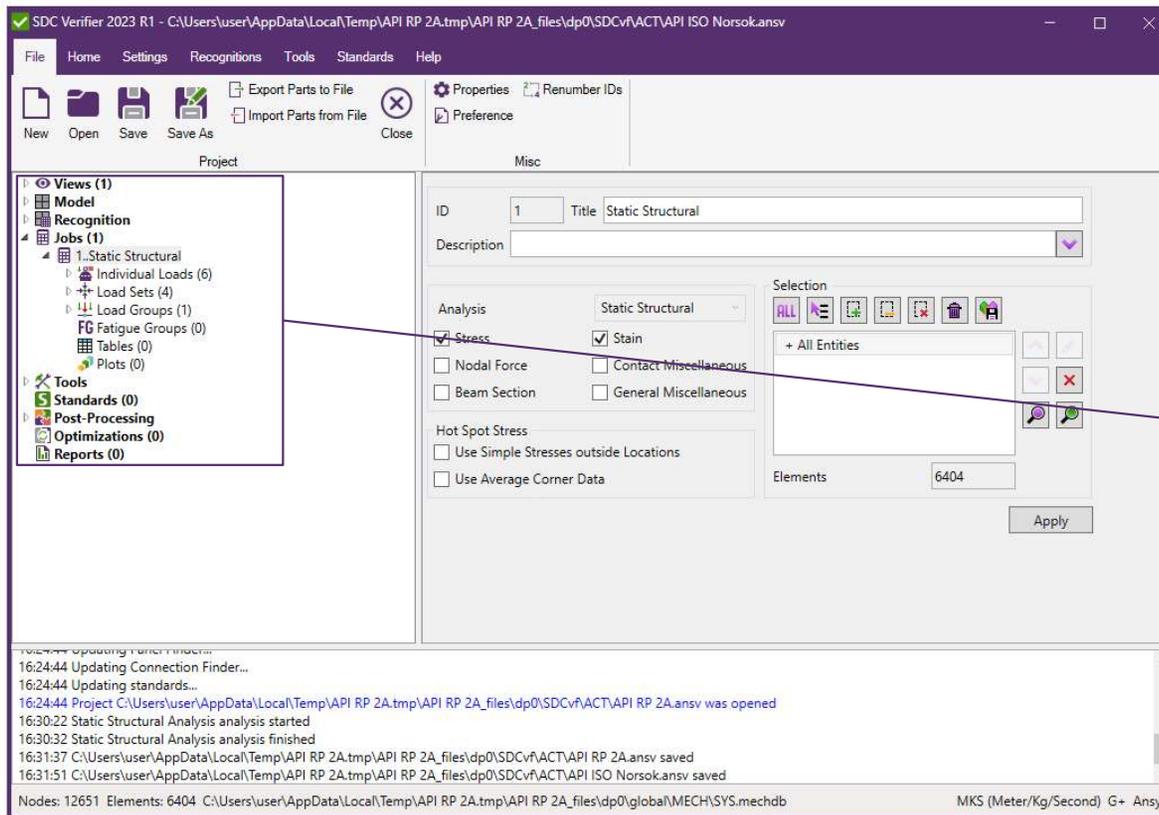


This tutorial uses project with predefined boundary condition, load combinations and load group. The model contains only circular tubes elements.

Analyze Job

1

Press  and select Analyze active job: **1..Static Structural**



1

Joint - location where different beam members connect. They are used to recognize beam member length by Beam Member Finder Tool.

There are 6 types of Joints:

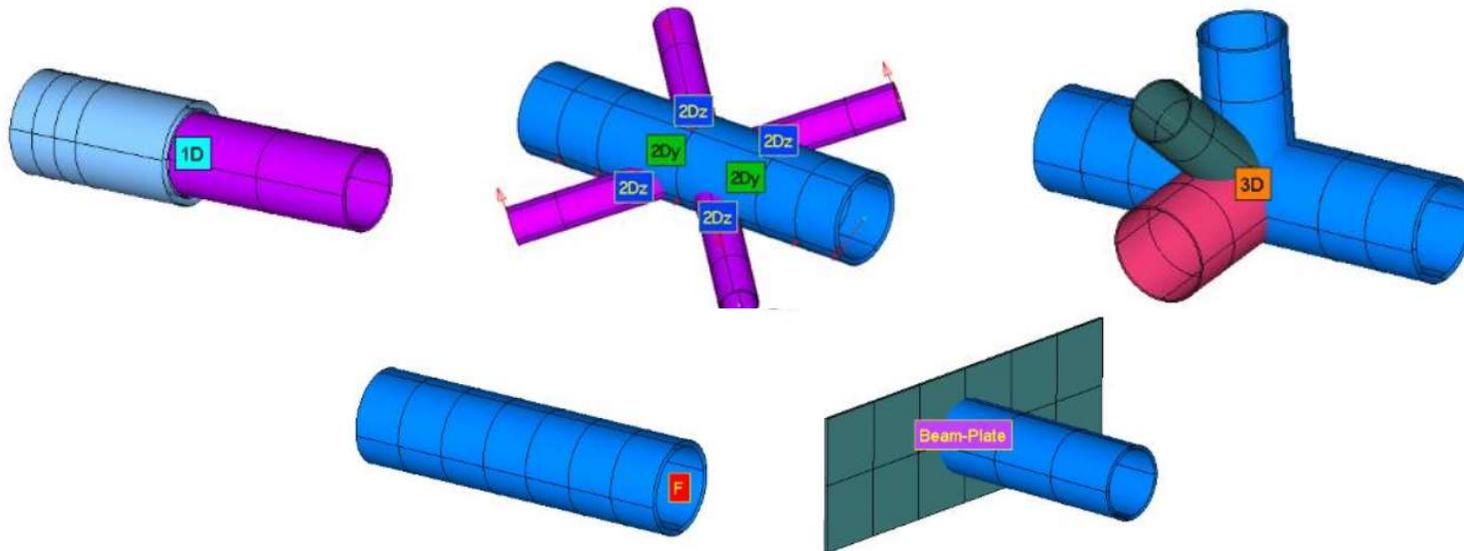
1D Joint - 2 beam members that lie on the curve but with different properties;

2D Joint - beam members connected in one plane;

3D Joint - beam members connected in space;

Free Joint - node which belongs only to one element (free);

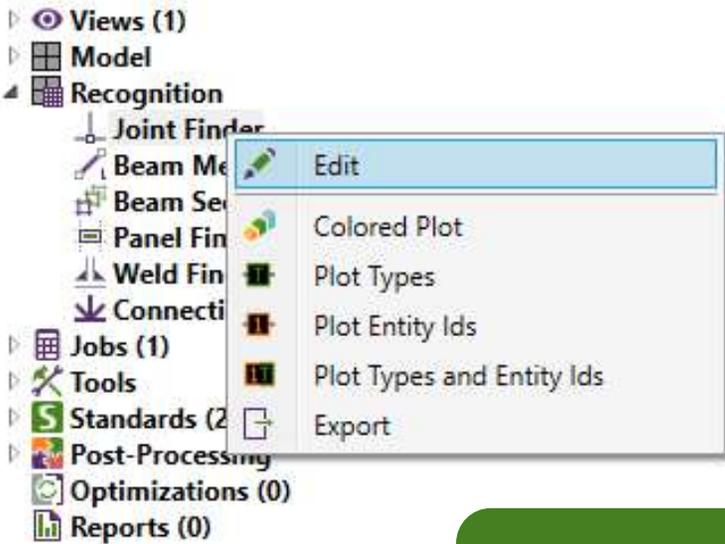
Beam-Plate Joint - beam member connected to plates (perpendicularly); User Defined;



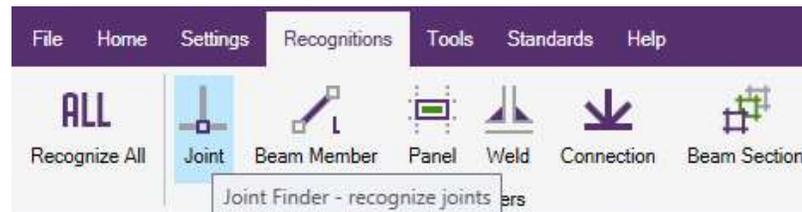
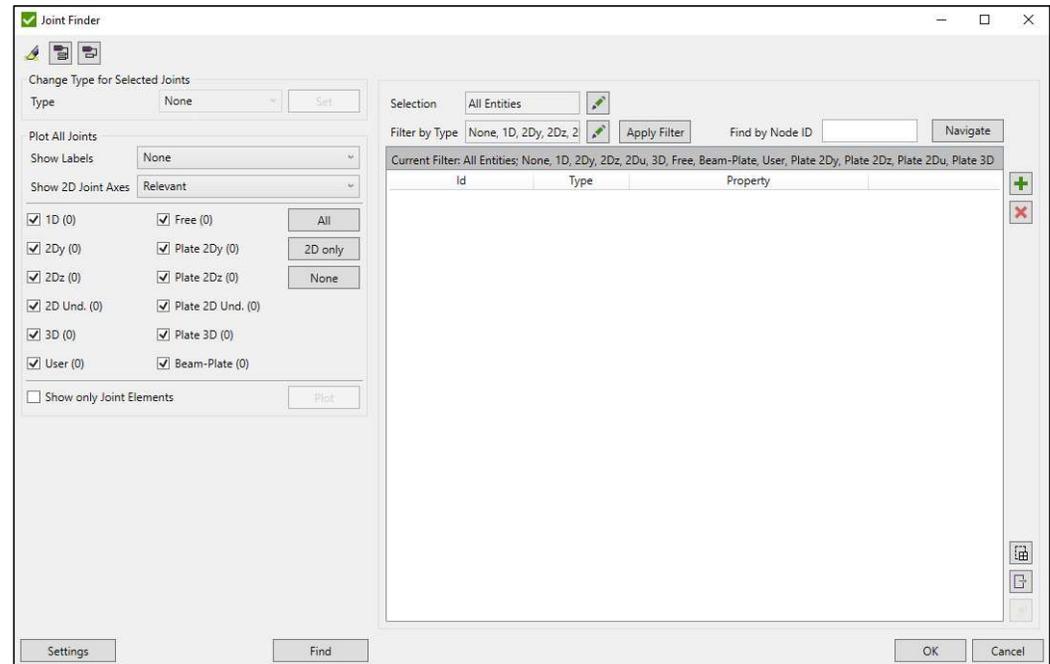
Joint Recognition

1 Execute **Edit** from **Joint Finder** context menu

2 Press **Find**.



It is possible go to **Recognitions** on Ribbon tab and press **Joint**:

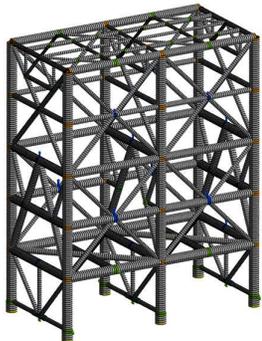


Joints Plot

1 Select All Joints (Ctrl+A).

2 Press and execute Plot Joint Type in Colors

3 Press **OK**.



Modify Joint Type

Plot Joints of specific type

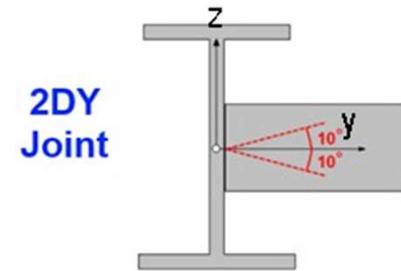
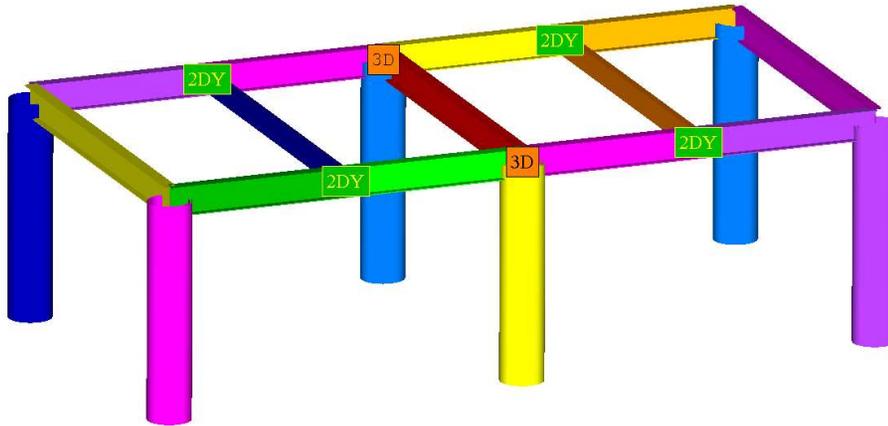
| Id | Type | Property |
|---------------|------|----------|
| Node ID = 1 | | |
| Node ID = 2 | 3D | |
| Node ID = 27 | 3D | |
| Node ID = 52 | | |
| Node ID = 53 | 3D | |
| Node ID = 78 | 3D | |
| Node ID = 103 | 3D | |
| Node ID = 104 | 2Dz | |
| Node ID = 129 | 3D | |
| Node ID = 154 | | |
| Node ID = 167 | | |
| Node ID = 192 | 3D | |
| Node ID = 205 | 2Dz | |
| Node ID = 230 | 3D | |
| Node ID = 255 | 2Dz | |
| Node ID = 280 | 3D | |
| Node ID = 305 | | |
| Node ID = 318 | | |
| Node ID = 343 | 3D | |
| Node ID = 356 | 2Dz | |
| Node ID = 405 | 3D | |
| Node ID = 419 | | |
| Node ID = 445 | 3D | |

3

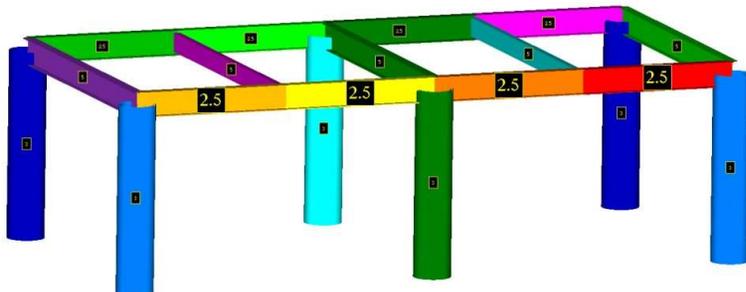
2

Beam Member Lengths in 2 directions

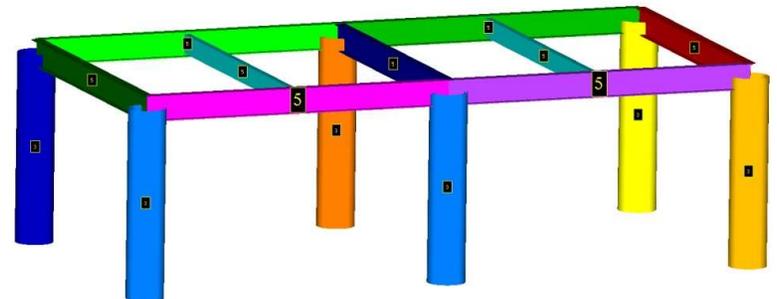
Beam Member Finder recognizes beam members and (buckling) lengths for different directions (Y, Z and Torsional).



Length Y - 4 Beam Members with L = 2.5



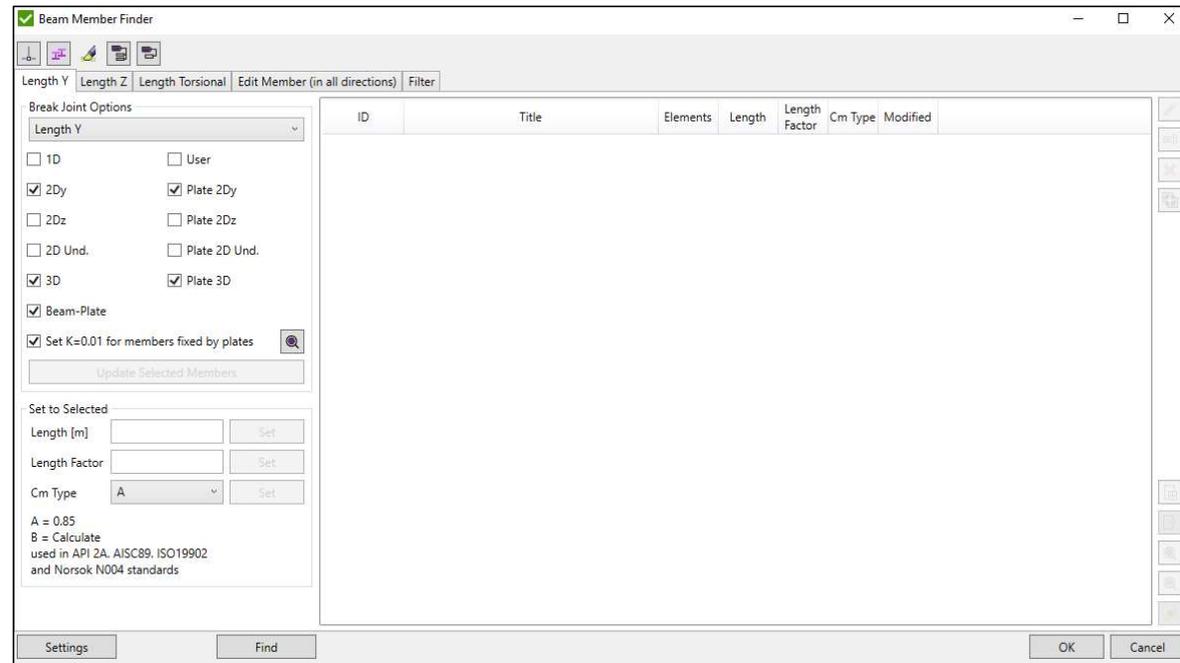
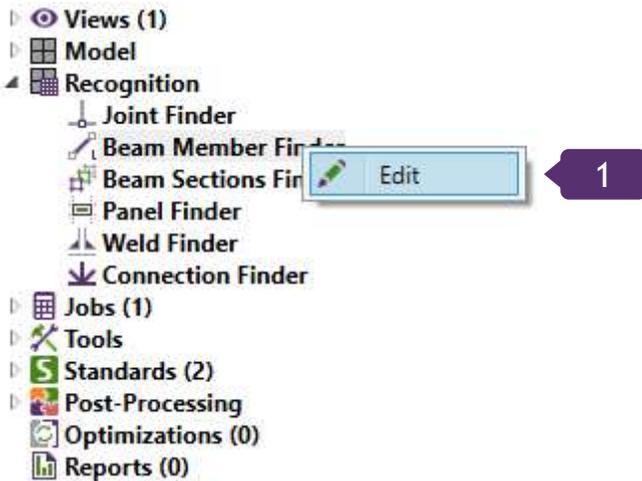
Length Z - 2 Beam Members with L = 5



Recognize Length

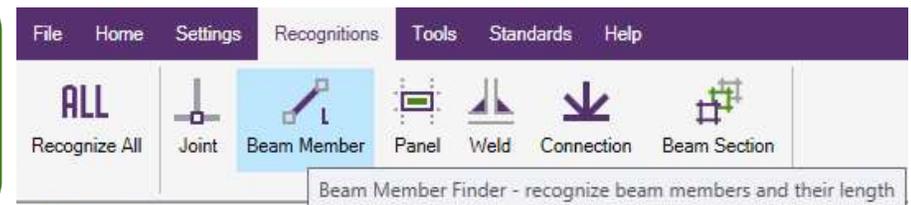
1 Execute **Edit** from **Beam Member Finder** context menu

2 Press **Find**.



Default *Break Joint Options* for Tabs:
Length Y: 2DY, 3D, Plate 2DY, Plate 3D
Length Z: 2DZ, 3D, Plate 2DZ, Plate 3D
Length Torsional: 2DY, 2DZ, 2D Und, 3D

It is possible to open it another way - go to **Recognitions** tab in Ribbon and press **Beam Member**:



Beam Member Finder interface

Beam Member - a straight line. If it contains joints it is split on sub members.

Break Options define what joints are used to split beam members

Change Length/Factor for selected beam members

Cm Type is used in API 2A, ISO 19902 and Norsok N004 standards

Press Settings to define recognition options: selection, default title

| ID | Title | Elements | Length | Length Factor | Cm Type | Modified | Joint - NodeID [Joint Type] |
|----|--------------------|----------|--------|---------------|---------|----------|-----------------------------|
| 1 | Beam Member 1 (Y) | 50 | 5 | 1 | A | | 1[2Dz] |
| 2 | Beam Member 2 (Y) | 50 | 5 | 1 | A | | 52[2Dz] |
| 3 | Beam Member 3 (Y) | 100 | 10 | | | | 458[2Dy] 405[3D] 507[2Dy] |
| 4 | Beam Member 4 (Y) | 100 | 10 | | | | 556[2Dy] 445[3D] 605[2Dy] |
| 5 | Beam Member 5 (Y) | 100 | 10 | | | | 103[3D] 356[2Dz] 104[2Dz] |
| 6 | Beam Member 6 (Y) | 51 | 5 | 1 | A | | 154[2Dz] 167[2Dz] |
| 7 | Beam Member 7 (Y) | 100 | 10 | | | | 205[2Dz] 230[3D] 255[2Dz] |
| 8 | Beam Member 8 (Y) | 51 | 5 | 1 | A | | 305[2Dz] 318[2Dz] |
| 9 | Beam Member 9 (Y) | 28 | 2.795 | 1 | A | | |
| 10 | Beam Member 10 (Y) | 56 | 5.59 | | | | 318[2Dy] |
| 11 | Beam Member 11 (Y) | 56 | 5.59 | | | | 305[2Dy] |
| 12 | Beam Member 12 (Y) | 50 | 5 | 1 | A | | 3368[2Dz] |
| 13 | Beam Member 13 (Y) | 103 | 10 | | | | 1176[3D] |
| 14 | Beam Member 14 (Y) | 50 | 5 | 1 | A | | 3518[2Dz] |
| 15 | Beam Member 15 (Y) | 103 | 10 | | | | |
| 16 | Beam Member 16 (Y) | 50 | 5 | 1 | A | | |
| 17 | Beam Member 17 (Y) | 28 | 2.795 | 1 | A | | |
| 18 | Beam Member 18 (Y) | 56 | 5.59 | | | | |
| 19 | Beam Member 19 (Y) | 56 | 5.59 | | | | |
| 20 | Beam Member 20 (Y) | 13 | 1.25 | 1 | A | | |
| 21 | Beam Member 21 (Y) | 28 | 2.795 | 1 | A | | |
| 22 | Beam Member 22 (Y) | 56 | 5.59 | | | | |

Press Find to automatically recognize Beam Members and Sub Members for all 3 directions (Y, Z and torsional)

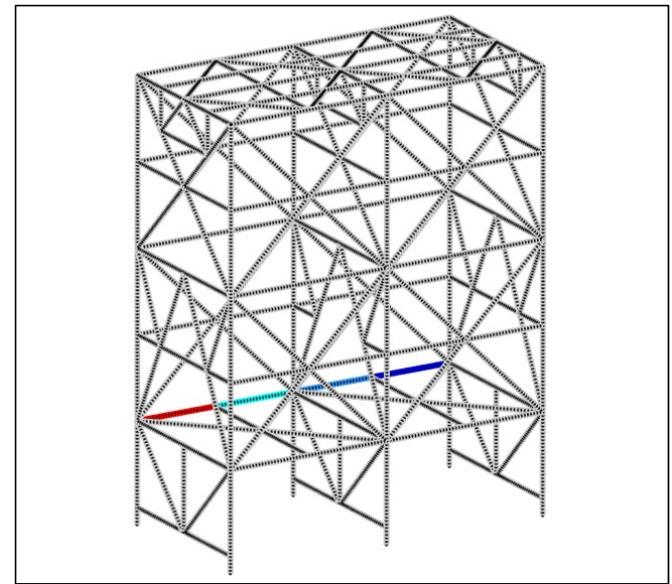
Colored Plot of members with labels (ID, Length, Factor or Cm Type).

Beam Member Finder interface

Break Joint Options define which types of joints will be used to split Beam Member on sub members. There are 3 predefined Break Joint Options (Length Y, Length Z, and Torsional) and custom.

Sub members from table on a plot:

| ID | Title | Elements | Length | Length Factor | Cm Type | Modified | Joint - NodelD [Joint Type] |
|-----|---------------------|----------|--------|---------------|---------|----------|-----------------------------|
| 1 | Beam Member 1 (Y) | 50 | 5 | 1 | A | | 1[2Dz] |
| 2 | Beam Member 2 (Y) | 50 | 5 | 1 | A | | 52[2Dz] |
| 3 | Beam Member 3 (Y) | 100 | 10 | | | | 458[2Dy] 405[3D] 507[2Dy] |
| 3.1 | Beam Member 3.1 (Y) | 25 | 2.5 | 1 | A | | |
| 3.2 | Beam Member 3.2 (Y) | 25 | 2.5 | 1 | A | | |
| 3.3 | Beam Member 3.3 (Y) | 25 | 2.5 | 1 | A | | |
| 3.4 | Beam Member 3.4 (Y) | 25 | 2.5 | 1 | A | | |
| 4 | Beam Member 4 (Y) | 100 | 10 | | | | 556[2Dy] 445[3D] 605[2Dy] |
| 5 | Beam Member 5 (Y) | 100 | 10 | | | | 103[3D] 356[2Dz] 104[2Dz] |
| 6 | Beam Member 6 (Y) | 51 | 5 | 1 | A | | 154[2Dz] 167[2Dz] |
| 7 | Beam Member 7 (Y) | 100 | 10 | | | | 205[2Dz] 230[3D] 255[2Dz] |
| 8 | Beam Member 8 (Y) | 51 | 5 | 1 | A | | 305[2Dz] 318[2Dz] |
| 9 | Beam Member 9 (Y) | 28 | 2.795 | 1 | A | | |
| 10 | Beam Member 10 (Y) | 56 | 5.59 | | | | 318[2Dy] |
| 11 | Beam Member 11 (Y) | 56 | 5.59 | | | | 305[2Dy] |
| 12 | Beam Member 12 (Y) | 50 | 5 | 1 | A | | 3368[2Dz] |
| 13 | Beam Member 13 (Y) | 103 | 10 | | | | 1176[3D] |
| 14 | Beam Member 14 (Y) | 50 | 5 | 1 | A | | 3518[2Dz] |
| 15 | Beam Member 15 (Y) | 103 | 10 | | | | 804[3D] |
| 16 | Beam Member 16 (Y) | 50 | 5 | 1 | A | | 3668[2Dz] |
| 17 | Beam Member 17 (Y) | 28 | 2.795 | 1 | A | | |
| 18 | Beam Member 18 (Y) | 56 | 5.59 | | | | 3825[2Dy] |

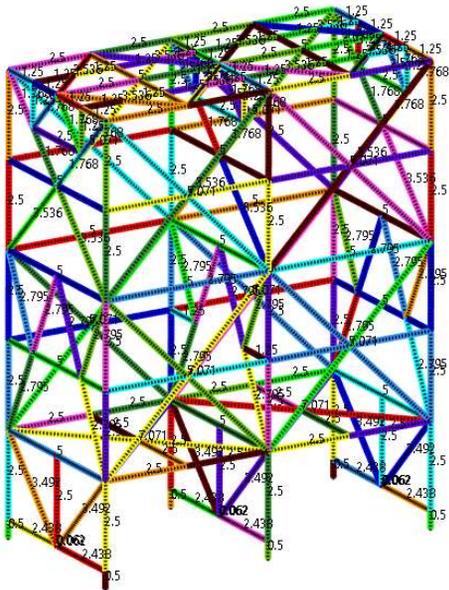


Beam Member's Length Plot

1 Select all Beam Members (Ctrl+A)

2 Press and execute to display **Length Plot**

3 Press **OK**.



| ID | Title | Elements | Length | Length Factor | Cm Type | Modified | Joint - NodeID [Joint Type] |
|-----|---------------------|----------|--------|---------------|---------|----------|-----------------------------|
| 1 | Beam Member 1 (Y) | 50 | 5 | 1 | A | | 1[2Dz] |
| 2 | Beam Member 2 (Y) | 50 | 5 | 1 | A | | 52[2Dz] |
| 3 | Beam Member 3 (Y) | 100 | 10 | | | | 458[2Dy] 405[3D] 507[2Dy] |
| 3.1 | Beam Member 3.1 (Y) | 25 | 2.5 | 1 | A | | |
| 3.2 | Beam Member 3.2 (Y) | 25 | 2.5 | 1 | A | | |
| 3.3 | Beam Member 3.3 (Y) | 25 | 2.5 | 1 | A | | |
| 3.4 | Beam Member 3.4 (Y) | 25 | 2.5 | 1 | A | | |
| 4 | Beam Member 4 (Y) | 100 | 10 | | | | 556[2Dy] 445[3D] 605[2Dy] |
| 5 | Beam Member 5 (Y) | 100 | 10 | | | | 103[3D] 356[2Dz] 104[2Dz] |
| 6 | Beam Member 6 (Y) | 51 | 5 | 1 | A | | 154[2Dz] 167[2Dz] |
| 7 | Beam Member 7 (Y) | 100 | 10 | | | | 205[2Dz] 230[3D] 255[2Dz] |
| 8 | Beam Member 8 (Y) | 51 | 5 | 1 | A | | 305[2Dz] 318[2Dz] |
| 9 | Beam Member 9 (Y) | 28 | 2.795 | 1 | A | | |
| 10 | Beam Member 10 (Y) | 56 | 5.59 | | | | 318[2Dy] |
| 11 | Beam Member 11 (Y) | 56 | 5.59 | | | | |
| 12 | Beam Member 12 (Y) | 50 | 5 | 1 | A | | |
| 13 | Beam Member 13 (Y) | 103 | 10 | | | | |
| 14 | Beam Member 14 (Y) | 50 | 5 | 1 | A | | |
| 15 | Beam Member 15 (Y) | 103 | 10 | | | | |
| 16 | Beam Member 16 (Y) | 50 | 5 | 1 | A | | |
| 17 | Beam Member 17 (Y) | 28 | 2.795 | 1 | A | | |
| 18 | Beam Member 18 (Y) | 56 | 5.59 | | | | |

- Plot selected members
- Plot Length Criteria
- Plot Members ID Labels
- Plot Full Members ID Labels
- Plot Length Labels
- Plot Cm Type Labels
- Plot Length Factor Labels
- Plot Joints for Selected Members
- Plot Members Y and Z axes
- Plot Length Labels in Y and Z axes

Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms — Load and Resistance Factor Design

API RECOMMENDED PRACTICE 2A-LRFD (RP 2A-LRFD)
FIRST EDITION, JULY 1, 1993

American Petroleum Institute
1220 L Street, Northwest
Washington, DC 20005



This "Recommended Practice for Planning, Designing, and Constructing Fixed Offshore Platforms Load - and Resistance Factor Design" (LRFD) contains the design and engineering design principles and good practices that have been the basis of the API RP2A working strength design (WSD) recommended practice, now in its 20th Edition. The LRFD provisions have been developed from the WSD provisions using reliability based calibration.

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and content. This publication is intended to supplement rather
than replace individual engineering judgment.

OFFICIAL PUBLICATION



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Cm - reduction factors

$$\frac{f_c}{\phi_c F_{cn}} + \frac{1}{\phi_b F_{bn}} \left\{ \left[\frac{C_{my} f_{by}}{\left(1 - \frac{f_c}{\phi_c F_{ey}}\right)} \right]^2 + \left[\frac{C_{mz} f_{bz}}{\left(1 - \frac{f_c}{\phi_c F_{ez}}\right)} \right]^2 \right\}^{0.5} \leq 1.0 \quad \dots\dots (D.3.2-1)$$

**TABLE D.3-1
EFFECTIVE LENGTH AND BENDING
REDUCTION FACTORS FOR
MEMBER STRENGTH CHECKING**

| Situation | Effective Length Factor K | Reduction Factor Cm ⁽¹⁾ |
|--|---------------------------|------------------------------------|
| Superstructure Legs | | |
| Braced | 1.0 | (a) |
| Portal (unbraced) | K ⁽²⁾ | (a) |
| Jacket Legs & Piling | | |
| Grouted Composite Section | 1.0 | (c) |
| Ungouted Jacket Legs | 1.0 | (c) |
| Ungouted Piling Between Shim Points | 1.0 | (b) |
| Jacket Braces | | |
| Face-to-face Length of Main Diagonals | 0.8 | (b) or (c) |
| Face of Leg to Centerline of Joint Length of K-Braces ⁽³⁾ | 0.8 | (c) |
| Longer Segment Length of X-Braces ⁽³⁾ | 0.9 | (c) |
| Secondary Horizontals | 0.7 | (c) |
| Deck Truss Chord members | 1.0 | (a),(b) or (c) |
| Deck Truss Web Members | | |
| In-Plane Action | 0.8 | (b) |
| Out-of-Plane Action | 1.0 | (a) or (b) |

Cmy and Cmz reduction factors are used in combined axial and bending check. API RP 2A description:

By default *Cm Type* is equal to A = 0.85 for all members. It is possible to modify Cm Type for selected members:

In SDC Verifier B = minimum from (b) and (c)

- Cmy and Cmz factors for ISO 19902 can be found in the Table 13.5-1 and are used in the formula 13.3-3.
- Cmy and Cmz factors for Norsok N004 Rev3 can be found in the Table 6-2 and are used in the formula 6.27

Notes to Table D.3-1:

(1) Use whichever is more applicable to a specific situation. Values of the reduction factor Cm referred to in the above table are as follows:

(a) 0.85

(b) $0.6 - 0.4 \frac{M_1}{M_2}$, no more than 0.85, or less than 0.40, where M₁/M₂ is the ratio of smaller to larger moments at the ends of that portion of the member unbraced in the plane of bending under consideration. M₁/M₂ is positive when the number is bent in reverse curvature, negative when bent in single curvature.

(c) $1.0 - 0.4 \frac{f_c}{\phi_c F_e}$, or 0.85, whichever is less

Cm Type

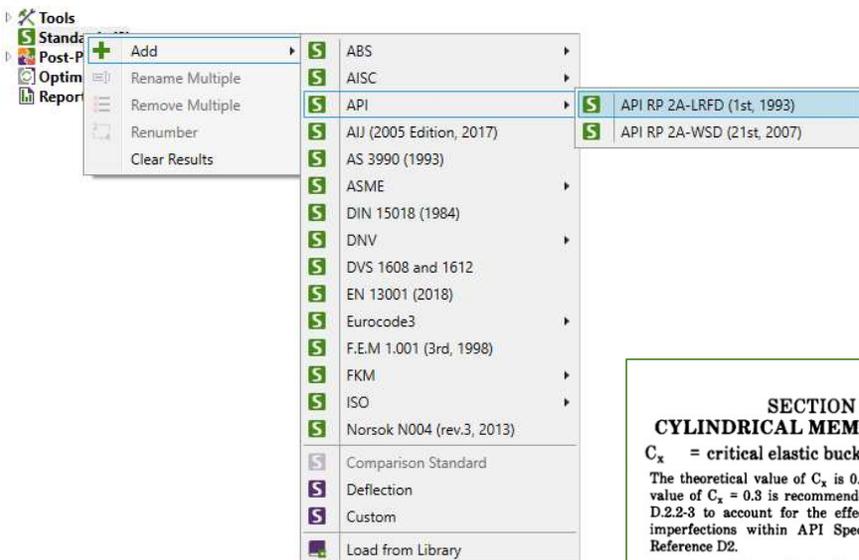
A = 0.85
 B = Calculate
 used in API 2A, AISC89, ISO19902
 and Norsok N004 standards

Add API RP 2A-LRFD standard

1

Execute **Standards** => **Add** => **API RP 2A-LRFD (1st, Jul 1993)**.

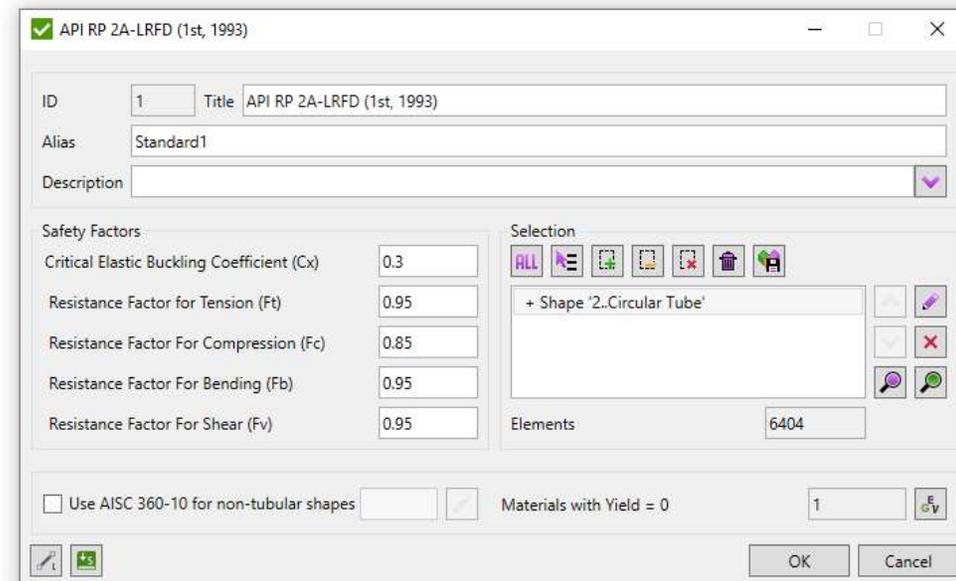
API 2A RP standard covers the design checks only cylindrical types of shapes.



**SECTION D
CYLINDRICAL MEMBER DESIGN**

C_x = critical elastic buckling coefficient
 The theoretical value of C_x is 0.6. However, a reduced value of $C_x = 0.3$ is recommended for use in Equation D.2.2-3 to account for the effect of initial geometric imperfections within API Spec 2B tolerance limits, Reference D2.

ϕ_t = resistance factor for axial tensile strength, 0.95
 ϕ_c = resistance factor for axial compressive strength, 0.85
 ϕ_b = resistance factor for bending strength, 0.95.
 ϕ_v = resistance factor for beam shear strength, 0.95



Define Material Characteristics

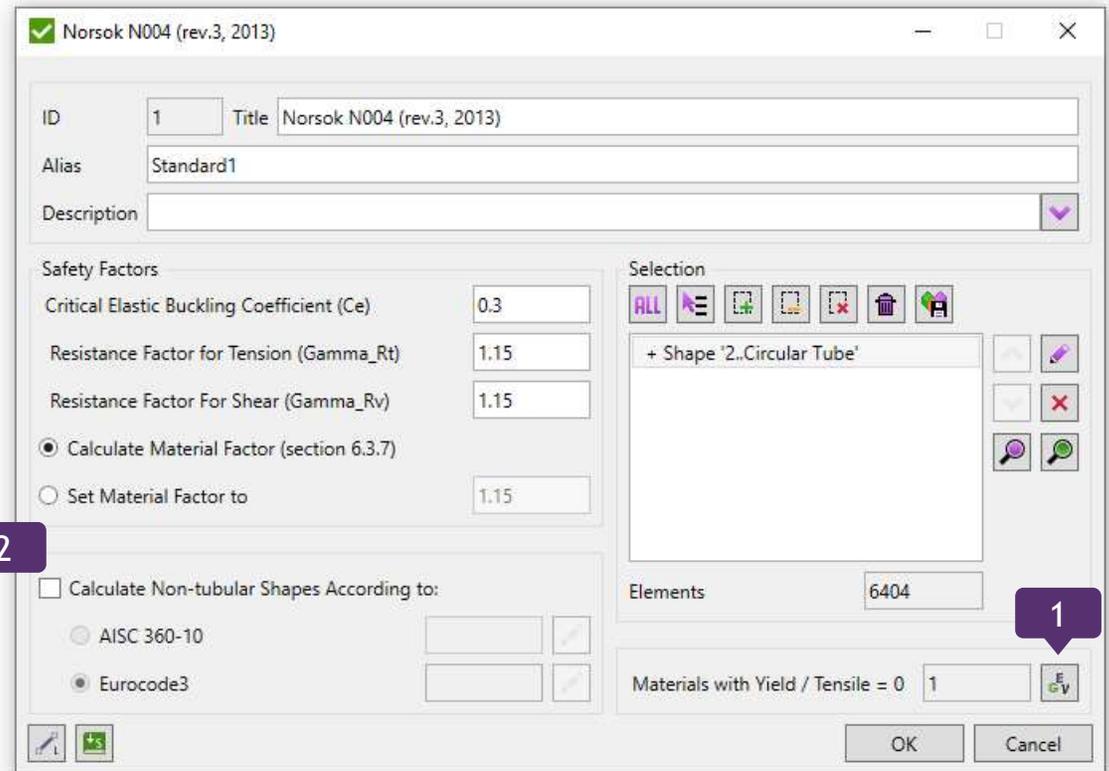
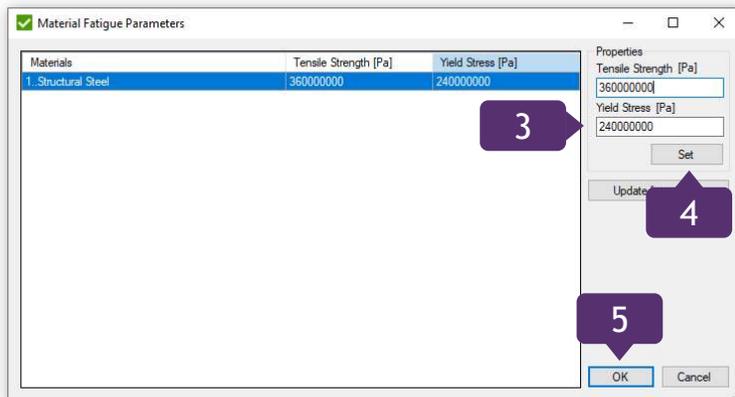
1 Press to set the material yield stress and tensile strength

2 Tensile Strength: **360e+6**

3 Yield Stress: **240e+6**

4 Press **Set**

5 Press **OK**



Extreme table for bending check

1 Execute **Table** from **Bending Stress Check** context menu

2 Press to select load

3 Load Type: **Load Group**

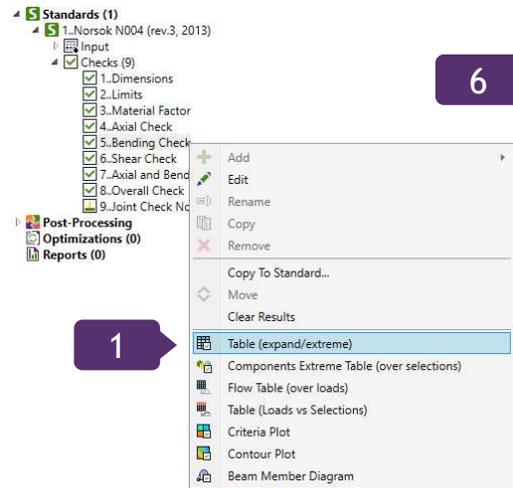
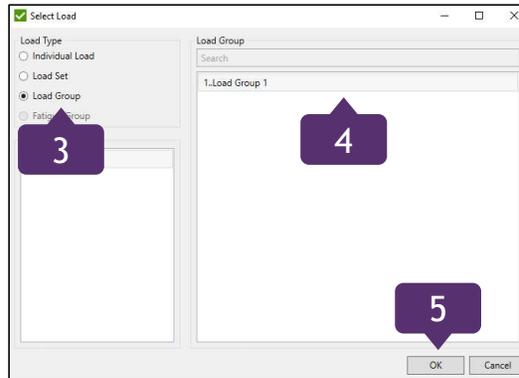
4 Load: **1..Load Group 1**

5 Press **OK**

6 Extreme Options: **Detailed**

7 Press **Fill Table**

8 Press **OK**



Overall Check contains results from all checks. With the help of one table/plot it is possible to verify if the model passes the checks (< 1). Overall Utilization Factor = worst Uf among all checks.

| ID | Title | Extreme | Bending Moment [N] | Bending Strength [N] | Bending Moment Resistance [N] | Utilization Factor |
|----|------------|---------|--------------------|----------------------|-------------------------------|--------------------|
| 1 | | Maximum | 0.00 | 308388256.00 | 22125.36 | 0.00 |
| | Value | | 2960 | 455 | 5211 | 2960 |
| | Load | | IL4 | IL6 | IL6 | IL4 |
| | Maximum | | | | | |
| | Value | | 1394314.88 | 330288032.00 | 1279478.13 | 1.09 |
| | Element ID | | 6390 | 3037 | 6375 | 6390 |
| | Load | | IL5 | IL6 | IL6 | IL5 |
| | Absolute | | | | | |
| | Value | | 1394314.88 | 330288032.00 | 1279478.13 | 1.09 |
| | Element ID | | 6390 | 3037 | 6375 | 6390 |
| | Load | | IL5 | IL6 | IL6 | IL5 |

Criteria Plot for Bending Stress Check

1 Execute **Criteria Plot** from **Bending Stress Check** context menu

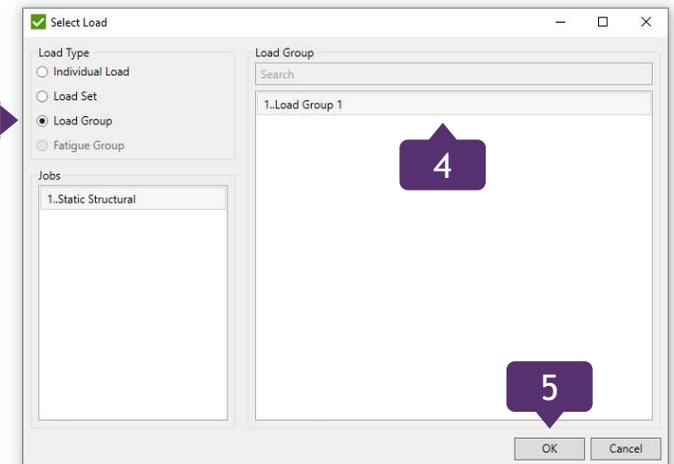
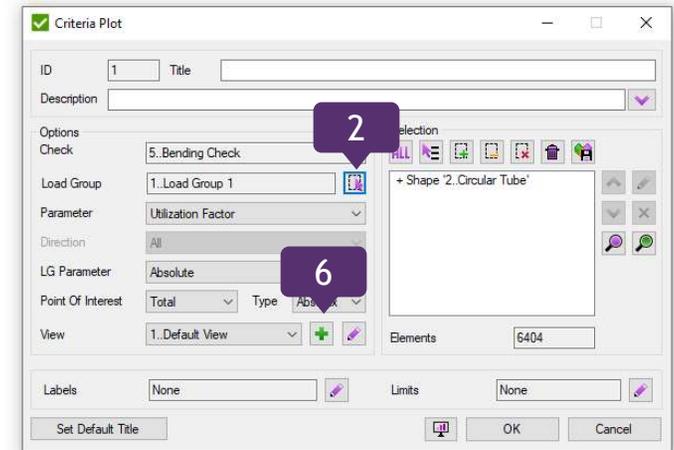
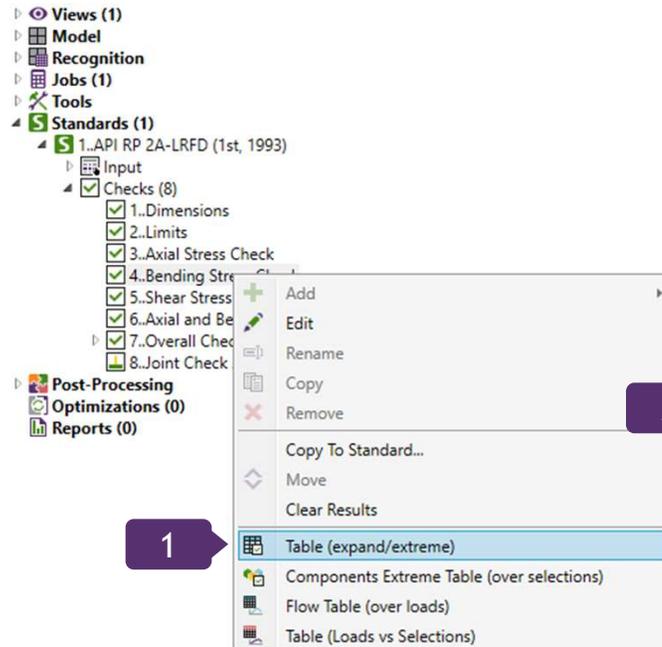
2 Press  to select load

3 Load Type: Load Group

4 Load: 1..Load Group 1

5 Press **OK**

6 Press to add view 



Plot. Create View

1 Title: *Isometric*

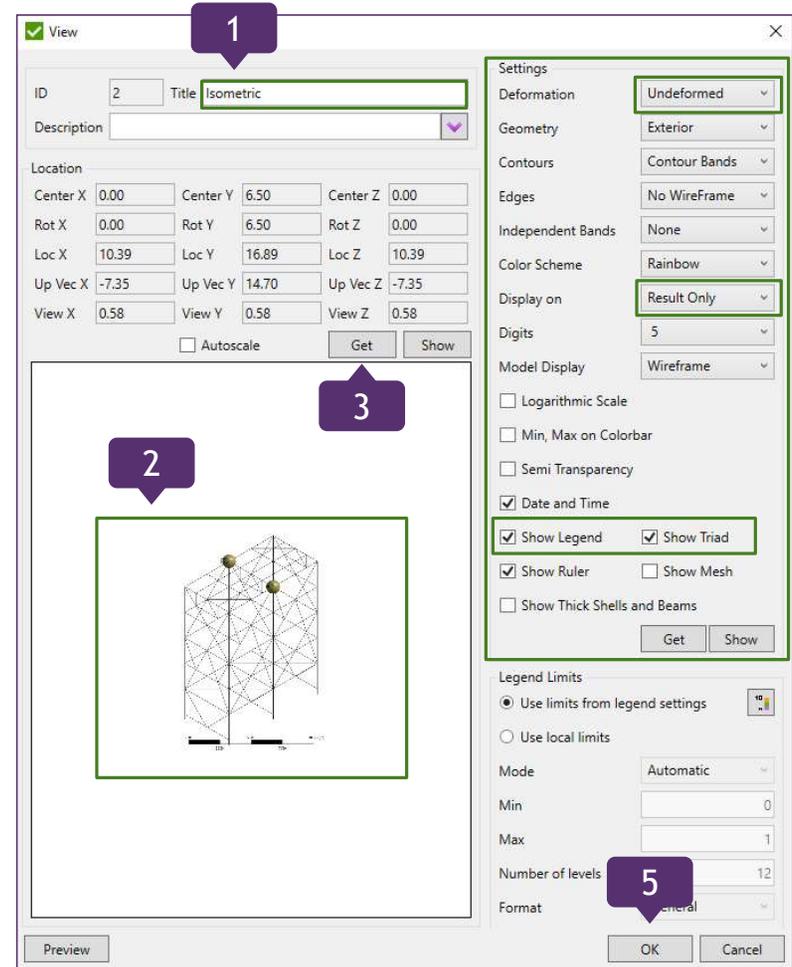
2 Orient model in Ansys Mechanical as shown on the picture

3 Press *Get*

4 Set parameters from notice 4

5 Press *OK*

Deformation: Undeformed
Display on: Result Only Show
Legend: On
Show Triad: On



Criteria plot for overall check

1 Execute from **Overall Check** context menu

2 Press to select load

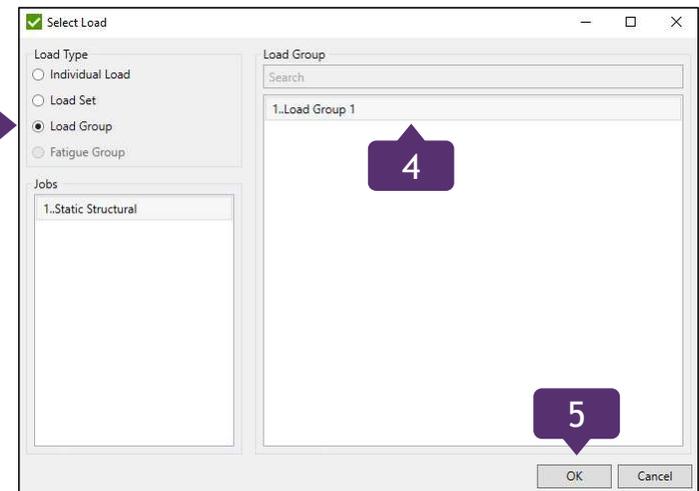
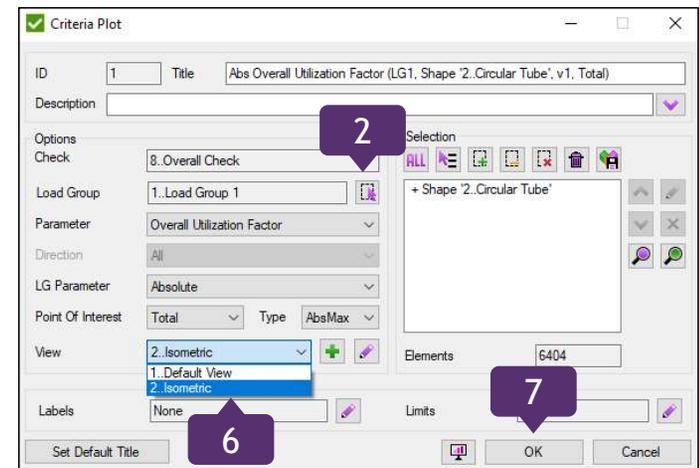
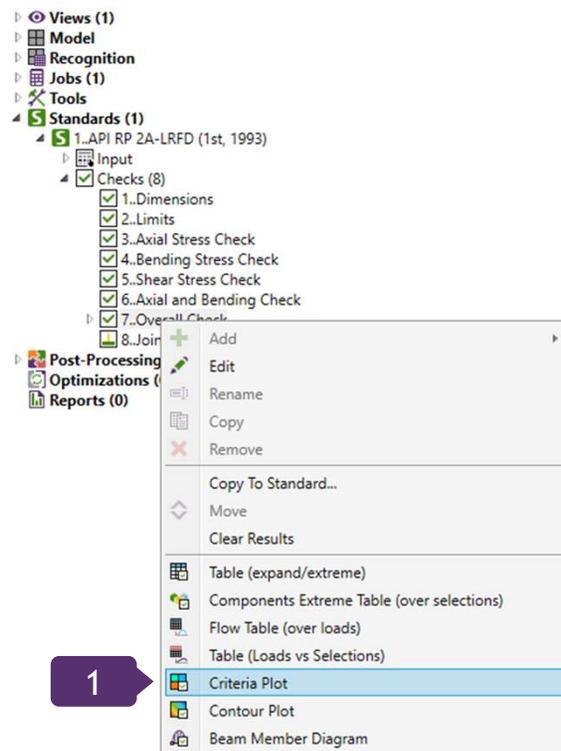
3 Load Type: Load Group

4 Load: 1..Load Group 1

5 Press **OK**

6 Select **Isometric** view

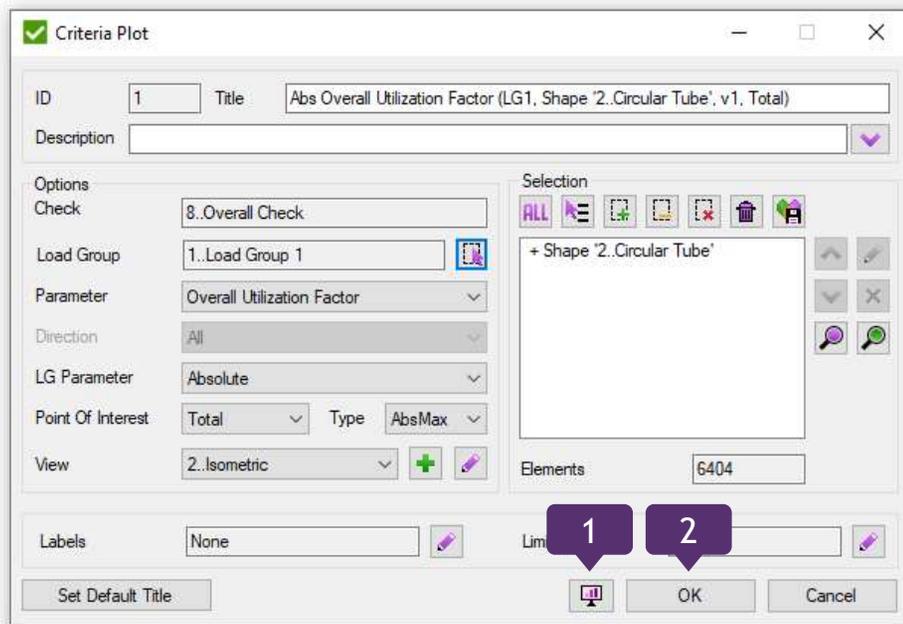
7 Press **OK**



Display Plot

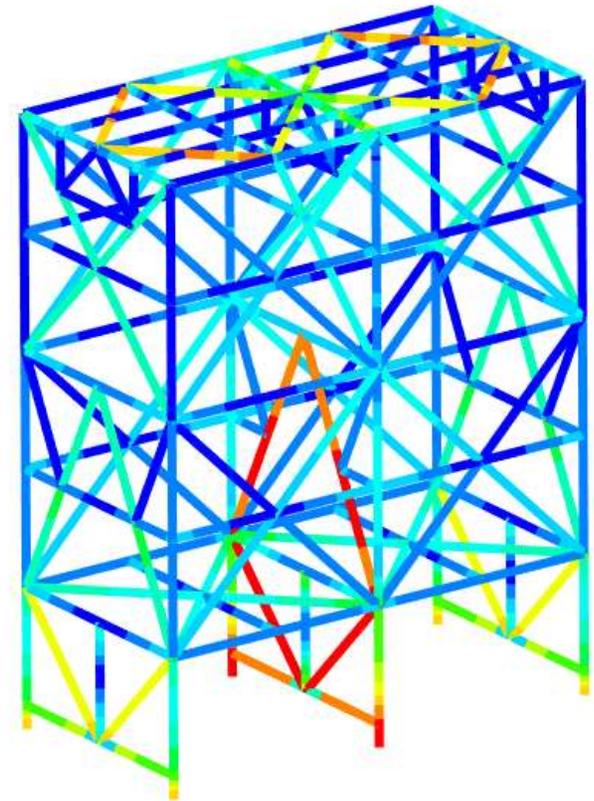
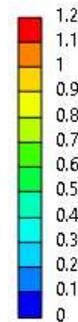
1 Press  to display plot

2 Press *OK*



A: All Loads

Abs Overall Utilization Factor (LG1, Shape '2..Circular Tube', v1, Total)
Expression: RES6 (Scoped to Elements)
Time: 6 s
Max: 1.8256
Min: 0.0056152
4/14/2023 11:27 AM



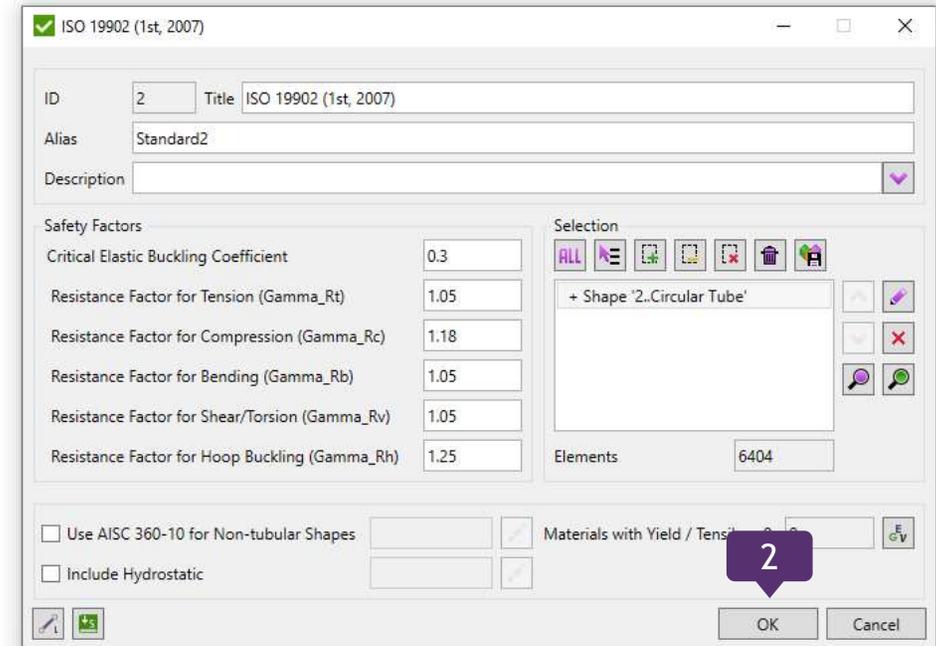
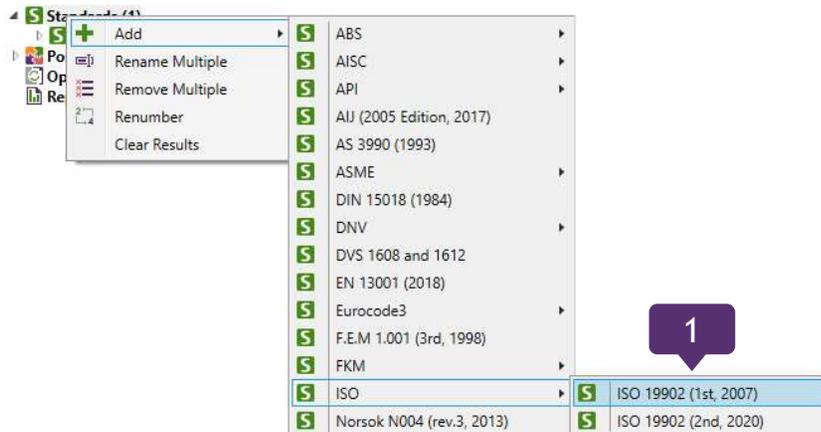
Add ISO 19902 standard

1

Execute **Standards => Add => ISO 19902 (1st, Dec 2007)**

2

Press **OK**



ISO 19902 procedure is similar to API 2A RP. In overall check it is possible to verify if the structure passes all checks : Overall Utilization Factor = worst U_f among all checks < 1 . Add extreme table and criteria plot for '1..Load Group 1' the same as for API standard.

C_x is the elastic critical buckling coefficient, see below;

The theoretical value of C_x for an ideal tubular is 0.6. However, a reduced value of $C_x = 0,3$ should be used in Equation (13.2-10) to account for the effect of initial geometric imperfections within the tolerance limits given in Clause 21. A reduced value of $C_x = 0,3$ is implicit in the value of f_{xe} used in Equations (13.2-8) and (13.2-9).

$\gamma_{R,t}$ is the partial resistance factor for axial tensile strength, $\gamma_{R,t} = 1,05$.

$\gamma_{R,c}$ is the partial resistance factor for axial compressive strength, $\gamma_{R,c} = 1,18$.

$\gamma_{R,b}$ is the partial resistance factor for bending strength, $\gamma_{R,b} = 1,05$;

$\gamma_{R,v}$ is the partial resistance factor for shear strength, $\gamma_{R,v} = 1,05$;

$\gamma_{R,h}$ is the partial resistance factor for hoop buckling strength, $\gamma_{R,h} = 1,25$.

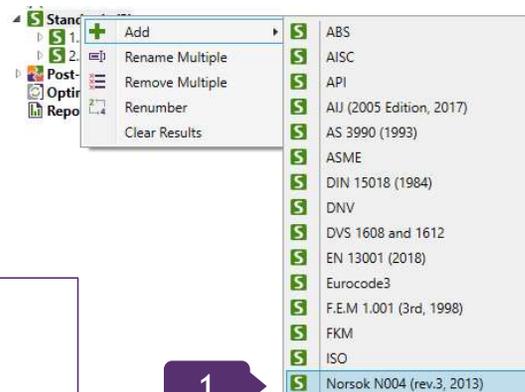
Add Norsok N004 standard

1

Execute **Standards => Add => Norsok N004 (rev.3, Feb 2013)**.

2

Press **OK**



1

Norsok N004 procedure is similar to API 2A RP. In overall check it is possible to verify if the structure passes all checks : Overall Utilization Factor = worst Uf among all checks < 1.

$C_e =$ critical elastic buckling coefficient = 0.3
 $\gamma_{R,t} =$ material factor for tension = 1.15
 $\gamma_{R,v} =$ material factor for shear = 1.15
 $\gamma_M =$ see section 6.3.7

$$\gamma_M = 1.15 \quad \text{for } \bar{\lambda}_s < 0.5 \quad (6.22)$$

$$\gamma_M = 0.85 + 0.60\bar{\lambda}_s \quad \text{for } 0.5 \leq \bar{\lambda}_s \leq 1.0$$

$$\gamma_M = 1.45 \quad \text{for } \bar{\lambda}_s > 1.0$$

where

$$\bar{\lambda}_s = \frac{|\sigma_{c,5d}|}{f_{cl}} \cdot \lambda_c + \left(\frac{\sigma_{p,5d}}{f_h} \right)^2 \cdot \lambda_h \quad (6.23)$$

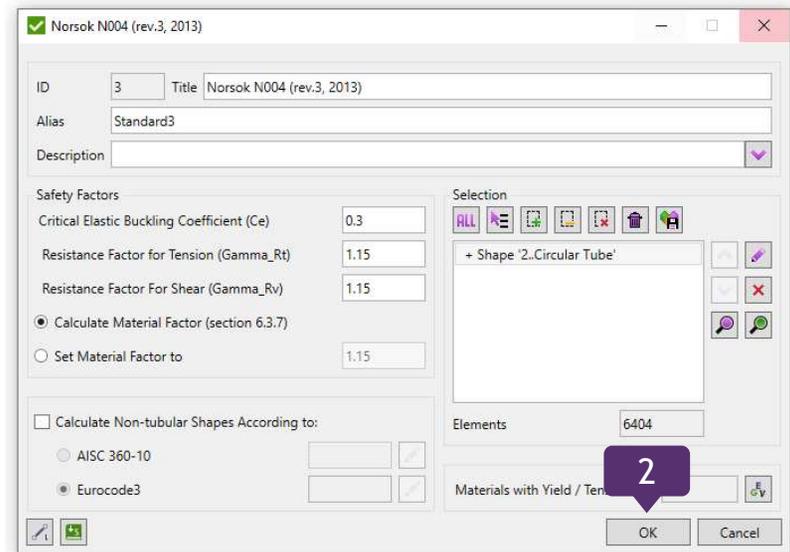
where f_{cl} is calculated from Equation (6.6) or Equation (6.7) whichever is appropriate and f_h from Equation (6.17), Equation (6.18), or Equation (6.19) whichever is appropriate.

$$\lambda_c = \sqrt{\frac{f_y}{f_{cle}}}, \quad \text{and} \quad \lambda_h = \sqrt{\frac{f_y}{f_{he}}} \quad (6.24)$$

f_{cle} and f_{he} is obtained from Equation (6.8), and Equation (6.20) respectively.
 $\sigma_{p,5d}$ is obtained from Equation (6.16) and

$$\sigma_{c,5d} = \frac{N_{5d}}{A} + \frac{\sqrt{M_{y,5d}^2 + M_{z,5d}^2}}{W} \quad (6.25)$$

N_{5d} is negative if in tension.

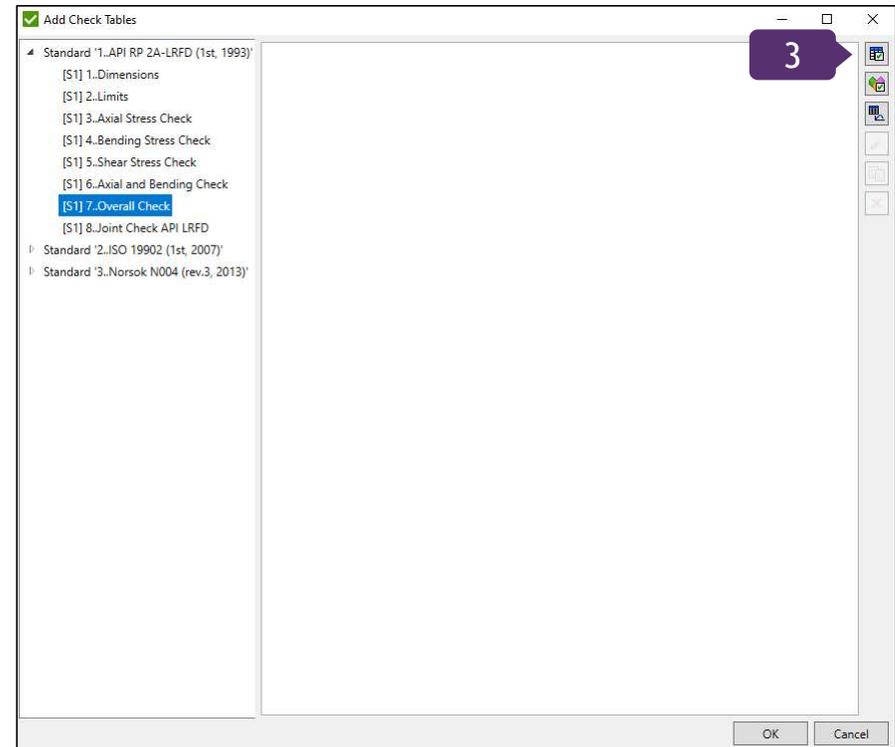
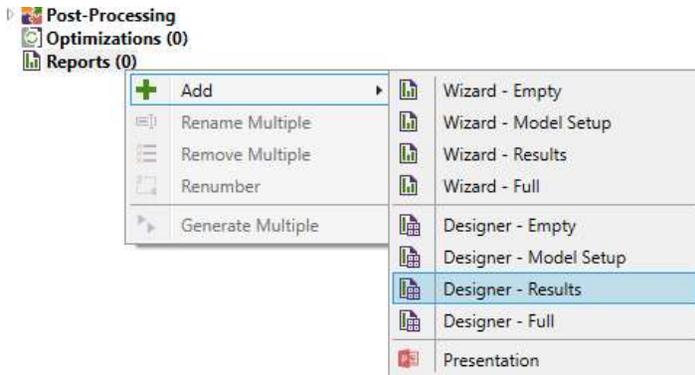
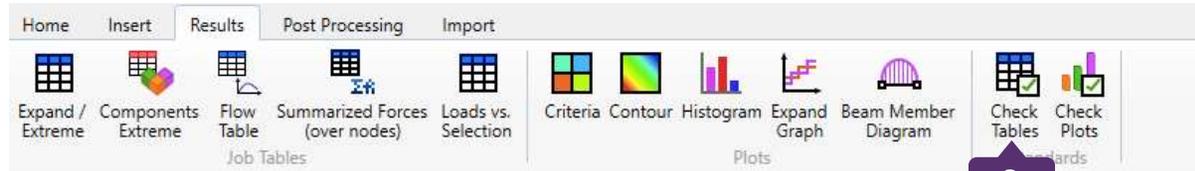


2

Report - Tables

1 Execute *Reports* => *Add* => *Designer Results*

2 *Results* => *Check Tables*. Select *Overall Check* and press *Add Check Tables*



There are 4 templates of the reports:

- *Empty* - only first page and preface items are included;
- *Model Setup* - description of the model data (materials, properties, components, boundary conditions) is included;
- *Results* - for each load extreme displacement tables, stress and displacement plots are included. Predefined tables: sum of reaction forces, stresses/displacements summary tables;
- *Full* - Model Setup + Results + all tables created in Job.

1 Select *Load Group 1*

2 Apply *All Entities*

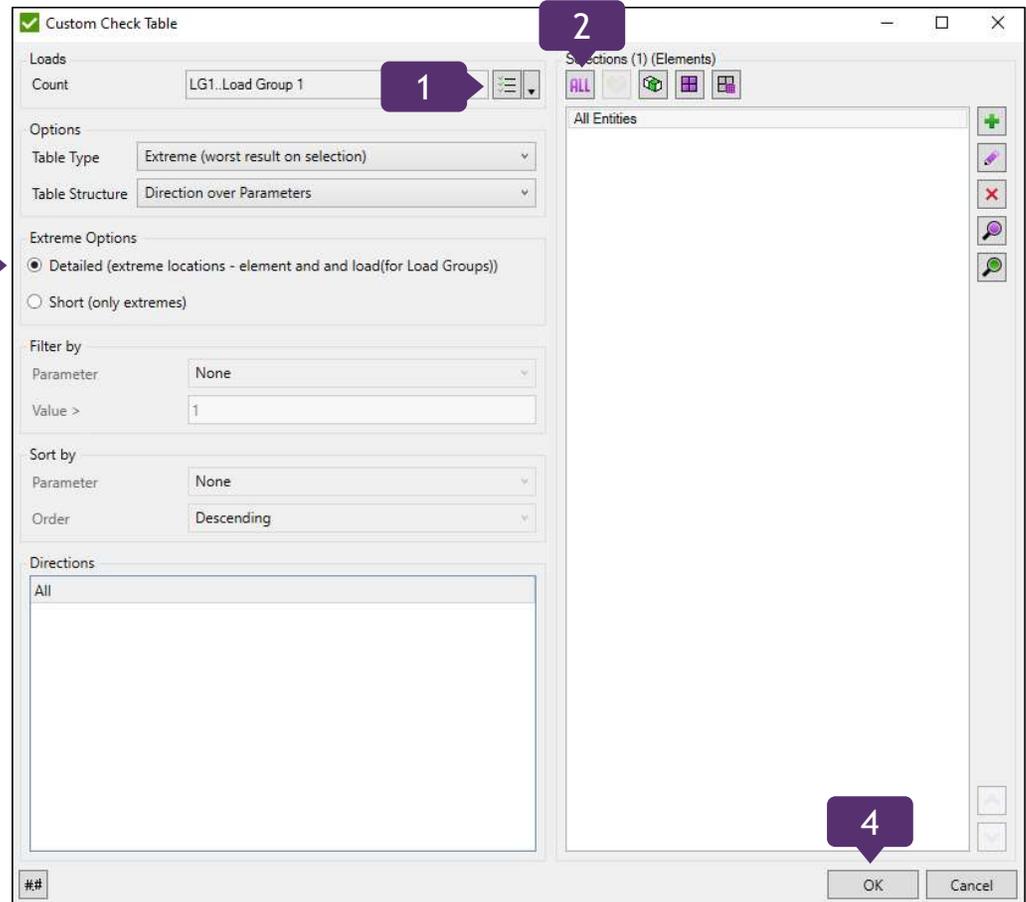
3 Select *Detailed*

4 Press *Ok*

5 Repeat 1-4 step for Standard *ISO 19902* and *Norsok N004*

✓ Add Check Tables

- Standard '1..API RP 2A-LRFD (1st, 1993)'
- Standard '2..ISO 19902 (1st, 2007)'
- Standard '3..Norsok N004 (rev.3, 2013)'



Report - Plots

1 Execute **Results** => **Check Plots**

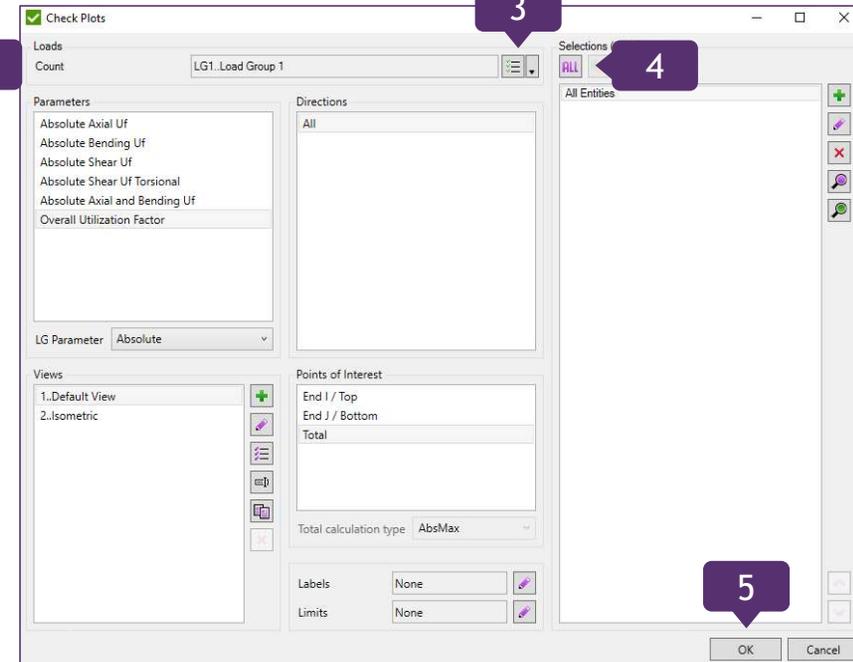
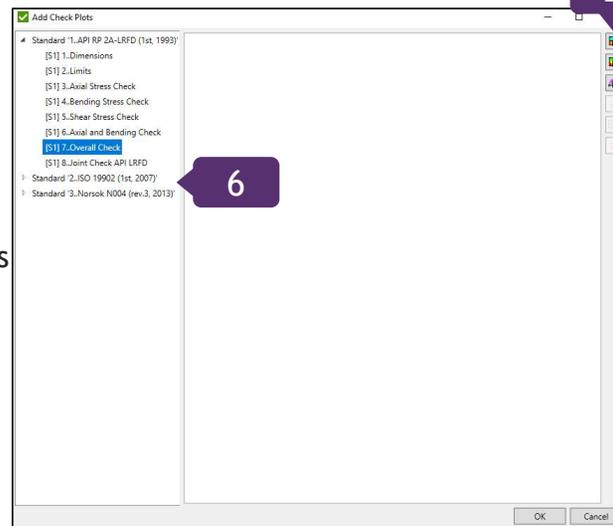
2 Select Standard **API RP 2A-LRFD** and press **Add Criteria Plot**

3 Select **Load Group 1**

4 Select **All Entities**

5 Press **OK**

6 Repeat 1-5 step for Standards **ISO 19902** and **Norsok N004**



Report - Plots

1

Select plot in *API RP 2A-LRFD* => *Abs UF Utilization Factor*

2

Select *Break Page Before* and press *No*

3

Select plot in *API RP 2A-LRFD* => *Abs UF Utilization Factor*

4

Select *Break Page Before* and press *No*

5

Repeat 1-4 step for Standards *ISO 19902* and *Norsok N004*

- Load Group '1..Load Group 1'
 - Displacement (LG1, All Entities)
 - Abs Usum (LG1, All Entities, v1)
 - Abs Seqv (LG1, All Entities, v1, Total [AbsMax])
 - Stress (LG1, All Entities)
 - Displacement (LG1, All Entities)
 - 1..API RP 2A-LRFD (1st, 1993)
 - All (LG1, All Entities)
 - Abs Overall Utilization Factor (LG1, All Entities, v1, Total)**
 - 2..ISO 19902 (1st, 2007)
 - All (LG1, All Entities)
 - Abs Overall Utilization Factor (LG1, All Entities, v1, Total)
 - 3..Norsok N004 (rev.3, 2013)
 - All (LG1, All Entities)
 - Abs Overall Utilization Factor (LG1, All Entities, v1, Total)

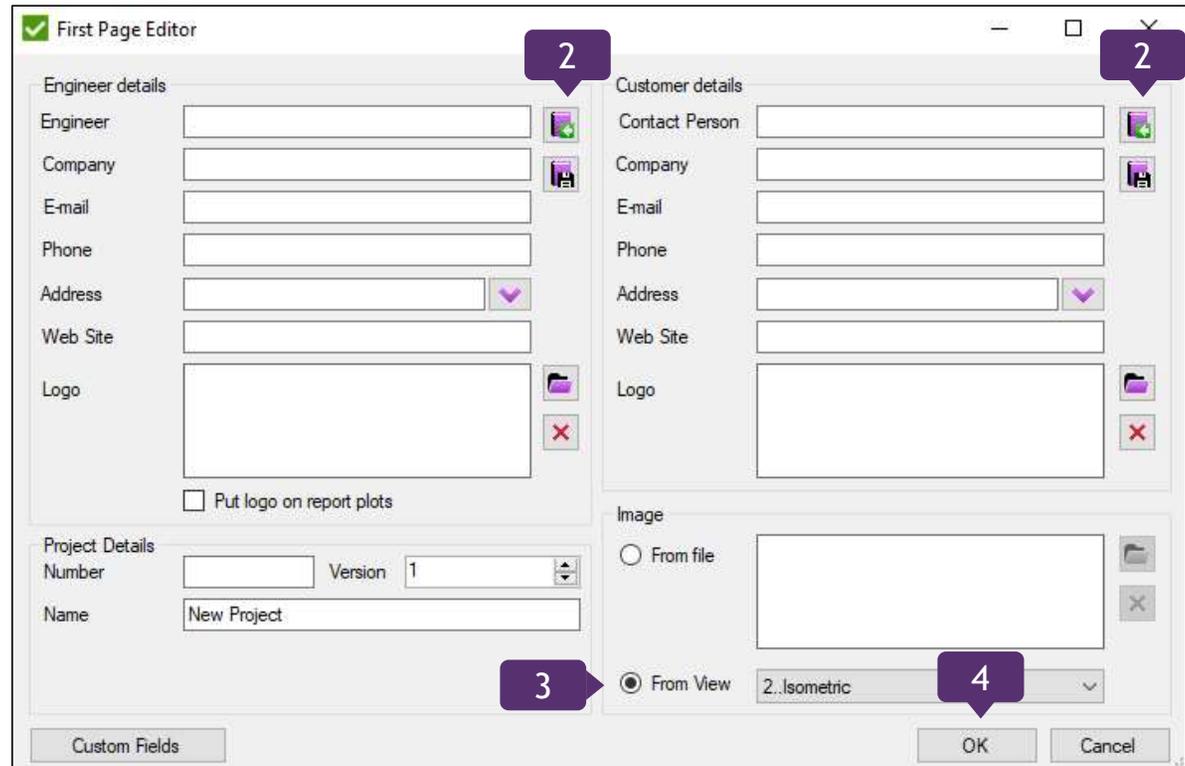
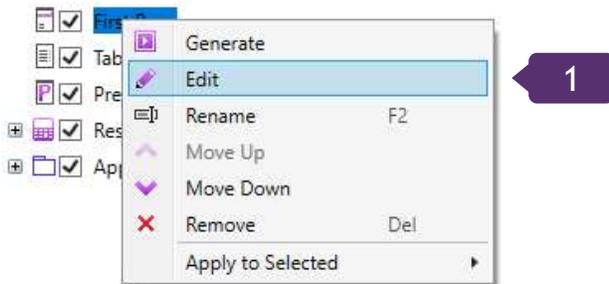
- Load Group '1..Load Group 1'
 - Displacement (LG1, All Entities)
 - Abs Usum (LG1, All Entities, v1)
 - Abs Seqv (LG1, All Entities, v1, Total [AbsMax])
 - Stress (LG1, All Entities)
 - Displacement (LG1, All Entities)
 - 1..API RP 2A-LRFD (1st, 1993)
 - All (LG1, All Entities)
 - Abs Overall Utilization Factor (LG1, All Entities, v1, Total)
 - 2..ISO 19902 (1st, 2007)
 - All (LG1, All Entities)
 - Abs Overall Utilization Factor (LG1, All Entities, v1, Total)
 - 3..Norsok N004 (rev.3, 2013)
 - All (LG1, All Entities)
 - Abs Overall Utilization Factor (LG1, All Entities, v1, Total)

The screenshot shows the SDC Verifier software interface. The 'Behavior' settings dialog box is open, with the following settings:

- Behavior**
 - Break Page Before: **No**
 - Enabled: Yes
- Data**
 - Check: 7..Overall Check
 - Last Time Generate: [blank]
 - Load: LG1..Load Group 1
 - Parameter: Absolute Overall Utilization Fa
 - Standard: 1..API RP 2A-LRFD (1st, 1993)
 - Title (Default): Abs Overall Utilization Factor (L
 - Title (User): [blank]
- Options**
 - Point: Total
 - Selection: **All Entities**
 - View: **1..Default View**

Report. First Page

- 1 Right click on *First Page* => *Edit*
- 2 Press  to load engineer and customer info from library
- 3 Select *Image From View* and pick *'2..Isometric'*.
- 4 Press *OK*.



The 'First Page Editor' dialog box is shown with the following sections and fields:

- Engineer details:** Engineer, Company, E-mail, Phone, Address, Web Site, Logo. Includes a checkbox for 'Put logo on report plots'.
- Customer details:** Contact Person, Company, E-mail, Phone, Address, Web Site, Logo.
- Project Details:** Number, Version (1), Name (New Project).
- Image:** Radio buttons for 'From file' and 'From View'. The 'From View' option is selected, and a dropdown menu shows '2..Isometric'.

Buttons at the bottom: Custom Fields, OK, Cancel. Purple callout bubbles with numbers 2, 3, and 4 point to the library icons, the 'From View' dropdown, and the 'OK' button respectively.

Report exported to Microsoft Word



1 Press to generate complete report

2 Press to export to Word



Report

New Project

Prepared by:

SDC Verifier

+31 15 30-10-310

sdcverifier.com

Zijlvest 25
2011 VB Haarlem
The Netherlands

Prepared for:

company

+31 15 355-55-55

company.com

Zijlvest 25
2011 VB Haarlem
The Netherlands

Engineer:

Support

Customer:

customer

Project Number:

Version:

1

Date:

14/04/2023

1.. API RP 2A-LRFD (1st, 1993)

Unit System
Current Unit System = MKS (Meter/Kg/Second). It is used in calculations for the following standards: API RP 2A, ISO 19902, Norsok N004, DIN 15018, FEM 1.001 and Eurocode3.

All (LG1, All Entities)

| Standard | 1.. API RP 2A-LRFD (1st, 1993) | Check Selection | [S1] 7.. Overall Check All Entities |
|------------|--------------------------------|-----------------|-------------------------------------|
| Load Group | LG1.. Load Group 1 | | |
| Extreme | | | |
| Value | 0.00 | 0.00 | 0.00 |
| Element ID | 4821 | 2954 | 2779 |
| Load | IL4 | IL4 | IL4 |
| Maximum | | | |
| Value | 1.24 | 1.00 | 1.05 |
| Element ID | 2461 | 6390 | 3405 |
| Load | IL5 | IL5 | IL5 |
| Absolute | | | |
| Value | 1.24 | 1.00 | 1.05 |
| Element ID | 2461 | 6390 | 3405 |
| Load | IL5 | IL5 | IL5 |

Abs Overall Utilization Factor (LG1, All Entities, v2)

| Check Parameter | [S1] 7.. Overall Check Absolute Overall Utilization Factor | Load Group Selection | LG1.. Load Group 1 All Entities |
|-----------------|--|----------------------|---------------------------------|
| View | 2.. Isometric | Data Conversion | No Averaging |

2.. ISO 19902 (1st, 2007)

Unit System
Current Unit System = MKS (Meter/Kg/Second). It is used in calculations for the following standards: API RP 2A, ISO 19902, Norsok N004, DIN 15018, FEM 1.001 and Eurocode3.

All (LG1, All Entities)

| Standard | 2.. ISO 19902 (1st, 2007) | Check Selection | [S2] 9.. Overall Check All Entities |
|------------|---------------------------|-----------------|-------------------------------------|
| Load Group | LG1.. Load Group 1 | | |
| Extreme | | | |
| Value | 0.00 | 0.00 | 0.00 |
| Element ID | 4821 | 2954 | 2779 |
| Load | IL4 | IL4 | IL4 |
| Maximum | | | |
| Value | 1.24 | 0.99 | 1.04 |
| Element ID | 2461 | 6390 | 3405 |
| Load | IL5 | IL5 | IL5 |
| Absolute | | | |
| Value | 1.24 | 0.99 | 1.04 |
| Element ID | 2461 | 6390 | 3405 |
| Load | IL5 | IL5 | IL5 |

Abs Overall Utilization Factor (LG1, All Entities, v2)

| Check Parameter | [S2] 9.. Overall Check Absolute Overall Utilization Factor | Load Group Selection | LG1.. Load Group 1 All Entities |
|-----------------|--|----------------------|---------------------------------|
| View | 2.. Isometric | Data Conversion | No Averaging |

3.. Norsok N004 (rev.3, 2013)

Unit System
Current Unit System = MKS (Meter/Kg/Second). It is used in calculations for the following standards: API RP 2A, ISO 19902, Norsok N004, DIN 15018, FEM 1.001 and Eurocode3.

All (LG1, All Entities)

| Standard | 3.. Norsok N004 (rev.3, 2013) | Check Selection | [S3] 8.. Overall Check All Entities |
|------------|-------------------------------|-----------------|-------------------------------------|
| Load Group | LG1.. Load Group 1 | | |
| Extreme | | | |
| Value | 0.00 | 0.00 | 0.00 |
| Element ID | 4821 | 2954 | 2779 |
| Load | IL4 | IL4 | IL4 |
| Maximum | | | |
| Value | 1.24 | 1.09 | 1.14 |
| Element ID | 2461 | 6390 | 3405 |
| Load | IL5 | IL5 | IL5 |
| Absolute | | | |
| Value | 1.24 | 1.09 | 1.14 |
| Element ID | 2461 | 6390 | 3405 |
| Load | IL5 | IL5 | IL5 |

Abs Overall Utilization Factor (LG1, All Entities, v2)

| Check Parameter | [S3] 8.. Overall Check Absolute Overall Utilization Factor | Load Group Selection | LG1.. Load Group 1 All Entities |
|-----------------|--|----------------------|---------------------------------|
| View | 2.. Isometric | Data Conversion | No Averaging |