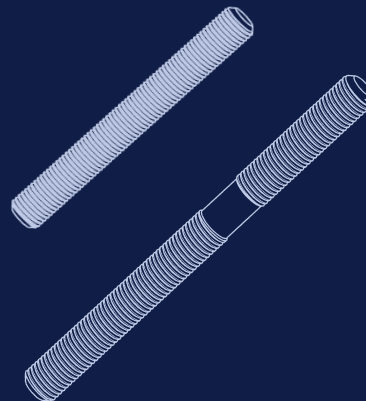
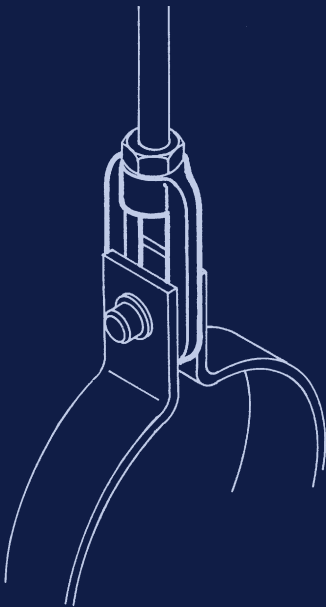
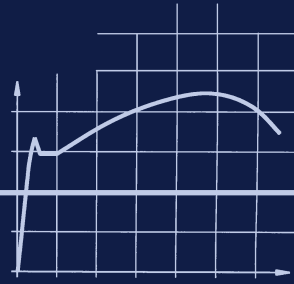
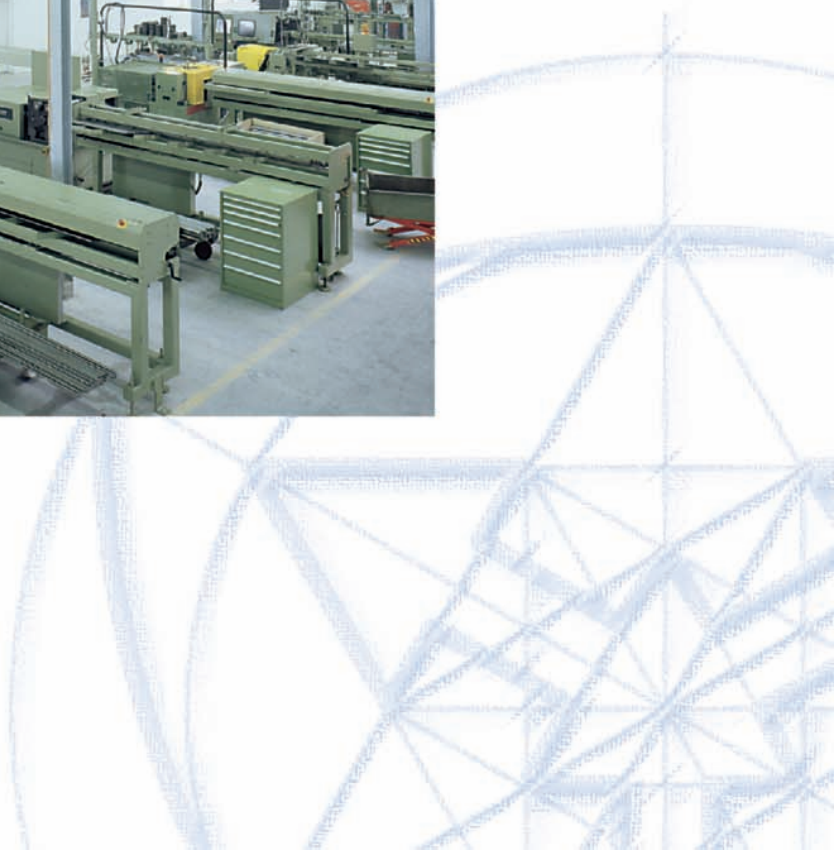
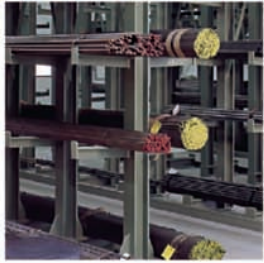
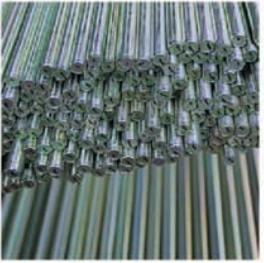


THREADED CONNECTING ELEMENTS

6



PRODUCT
GROUP



CONNECTING ELEMENTS

6

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PRODUCT GROUP **6**

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9

CONNECTING ELEMENTS TYPE 60 TO 64

In the connection component field, precision fit threads, reliable material grades and designs with safe load reserves are the prerequisite for the dependability of the entire load chain.



Eye nut, type 60



Clevis with pin, type 61



Turnbuckle, type 62



Rod coupling, type 64

The components in Product Group 6 are specially designed threaded elements for connecting the attachment rods to other support components. In the load chains, they connect components that in part have differently designed connections such as lugs, clevises or eye nuts.

The connecting parts in Product Group 6 form an independent group within the modular system and have been specially designed for optimum suitability as pipe support components.

The components are drop forged, and designed (apart from turnbuckles type 62) to allow slight length adjustments, despite their limited installation height.

The permissible loads correspond with the load table for statically determined pipe supports on page 0.5 of the **Technical Specifications**.

Eye nut Type 60 is used to join the rod to a pin connection, the clevis Type 61 to join it to a lug connection.

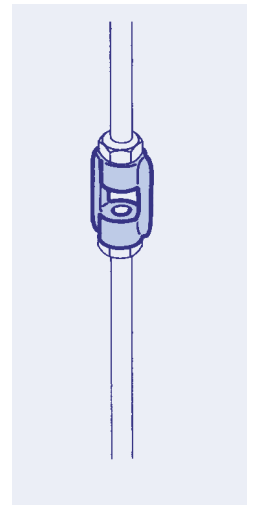
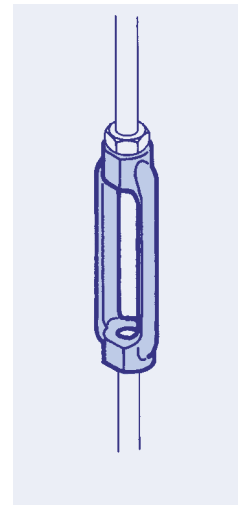
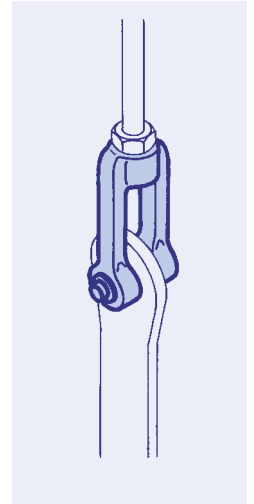
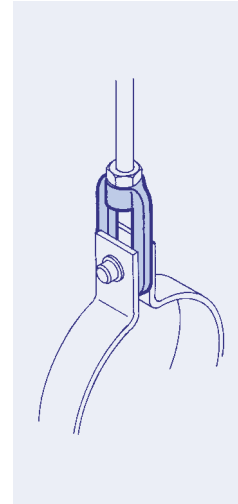
Turnbuckle Type 62 is supplied with a right-hand thread at one end and a left-hand thread at the other. It is used together with the tie rod Type 65 to provide length adjustment and presetting of the load chains.

Coupling Type 64 is used to produce rod lengths greater than 3m.

All threads (except in turnbuckles Type 62) are right-hand and available in metric or UNC standard.

For corrosion protection, all components are supplied complete with a standard electrogalvanized finish (zinc thickness approx. 15µm, yellow chromated for metric and white for UNC threads). For use in particularly aggressive environments, the components can be supplied with a hot dip galvanized finish.

Material certification can be supplied for all components if required.

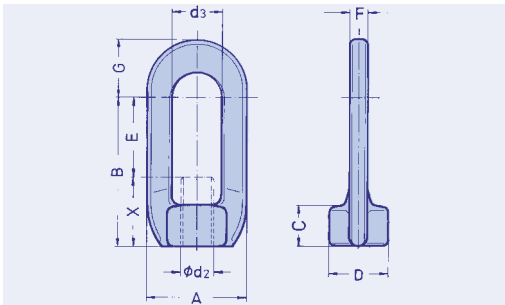


LISEGA connecting components offer special advantages:

- universal application
- load and connection compatibility with the LISEGA modular system
- drop forged and heat treated
- standard electrogalvanized or if required, hot dip galvanized finish
- qualification by special type testing

EYE NUT TYPE 60 CLEVIS WITH PIN TYPE 61

6

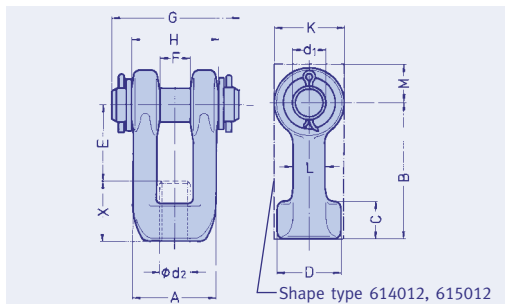


Eye nut
type 60 D9 19 to 60 50 12
Material: P250GH
drop forged

from load group 40:
Welded design
Material: S355J2G3

| Type | A | B | C | D | Ød2 | d3 | E | F | G | x | Weight (kg) |
|----------|-----|-----|-----|-----|-------|----|-----|----|-----|-----|-------------|
| 60 D9 19 | 24 | 40 | 11 | 17 | M10 | 13 | 25 | 5 | 15 | 15 | 0.05 |
| 60 29 12 | 33 | 60 | 15 | 24 | M12 | 17 | 40 | 6 | 19 | 20 | 0.10 |
| 60 39 12 | 44 | 75 | 20 | 30 | M16 | 25 | 45 | 10 | 26 | 30 | 0.20 |
| 60 49 12 | 59 | 90 | 25 | 35 | M20 | 29 | 55 | 10 | 35 | 35 | 0.40 |
| 60 59 12 | 72 | 110 | 30 | 44 | M24 | 35 | 65 | 15 | 44 | 45 | 0.80 |
| 60 69 12 | 88 | 127 | 37 | 50 | M30 | 42 | 75 | 17 | 54 | 52 | 1.20 |
| 60 79 12 | 100 | 140 | 45 | 60 | M36 | 47 | 75 | 20 | 62 | 65 | 2.00 |
| 60 89 12 | 110 | 157 | 52 | 70 | M42 | 52 | 85 | 25 | 72 | 72 | 2.90 |
| 60 99 12 | 120 | 180 | 60 | 80 | M48 | 62 | 85 | 30 | 78 | 95 | 4.70 |
| 60 10 12 | 135 | 200 | 65 | 95 | M56x4 | 62 | 105 | 40 | 80 | 95 | 7.70 |
| 60 20 12 | 150 | 230 | 70 | 105 | M64x4 | 72 | 130 | 40 | 85 | 100 | 8.80 |
| 60 30 12 | 160 | 230 | 70 | 110 | M68x4 | 72 | 130 | 40 | 90 | 100 | 9.30 |
| 60 40 12 | 220 | 250 | 120 | 125 | M72x4 | 82 | 100 | 50 | 110 | 150 | 27.00 |
| 60 50 12 | 250 | 280 | 140 | 140 | M80x4 | 92 | 120 | 60 | 125 | 160 | 45.00 |

Order details:
Eye nut type 60 .. 1.



Clevis with pin
type 61 D9 19 to 61 50 12
Material: P250GH
from load group 10:
S355J2G3
drop forged

from load group 40:
flame cut design
Material: S355J2G3

| Type | A | B | C | D | Ød1 | Ød2 | E | F | G | H | K | L | M | x | Weight (kg) |
|----------|-----|-----|----|-----|-----|-------|-----|----|-----|-----|-----|-------|-----|-----|-------------|
| 61 D9 19 | 23 | 50 | 11 | 17 | 10 | M10 | 35 | 11 | 50 | 25 | 21 | 5x9 | - | 15 | 0.1 |
| 61 29 12 | 33 | 70 | 15 | 25 | 12 | M12 | 50 | 12 | 60 | 34 | 24 | 8x12 | - | 20 | 0.2 |
| 61 39 12 | 42 | 80 | 20 | 33 | 16 | M16 | 50 | 17 | 70 | 44 | 32 | 11x15 | - | 30 | 0.4 |
| 61 49 12 | 55 | 90 | 25 | 40 | 20 | M20 | 55 | 20 | 90 | 57 | 46 | 16x21 | - | 35 | 1.0 |
| 61 59 12 | 65 | 110 | 30 | 46 | 24 | M24 | 65 | 22 | 105 | 68 | 53 | 19x25 | - | 45 | 1.6 |
| 61 69 12 | 72 | 130 | 35 | 51 | 33 | M30 | 80 | 27 | 125 | 80 | 64 | 19x29 | - | 50 | 2.7 |
| 61 79 12 | 85 | 150 | 40 | 61 | 40 | M36 | 90 | 32 | 140 | 93 | 80 | 22x36 | - | 60 | 4.4 |
| 61 89 12 | 100 | 170 | 50 | 72 | 45 | M42 | 100 | 37 | 165 | 110 | 90 | 27x40 | - | 70 | 7.2 |
| 61 99 12 | 120 | 180 | 60 | 83 | 50 | M48 | 95 | 42 | 185 | 130 | 100 | 33x44 | - | 85 | 10.4 |
| 61 10 12 | 130 | 215 | 65 | 90 | 60 | M56x4 | 120 | 50 | 210 | 150 | 120 | 30x45 | - | 95 | 14.8 |
| 61 20 12 | 155 | 230 | 70 | 110 | 70 | M64x4 | 130 | 60 | 245 | 175 | 150 | 35x55 | - | 100 | 24.4 |
| 61 30 12 | 155 | 230 | 70 | 110 | 70 | M68x4 | 125 | 60 | 245 | 175 | 150 | 35x55 | - | 105 | 24.4 |
| 61 40 12 | 150 | 240 | 80 | - | 80 | M72x4 | 130 | 56 | 230 | 150 | 150 | - | 90 | 110 | 42.0 |
| 61 50 12 | 165 | 260 | 90 | - | 90 | M80x4 | 140 | 64 | 240 | 165 | 180 | - | 110 | 120 | 60.0 |

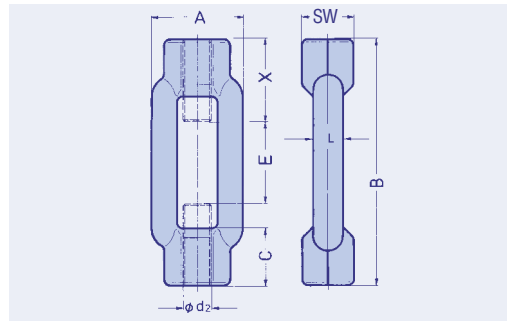
Pin
C35E + QT complete with
cotter pin DIN EN ISO 1234
and washer DIN 1441

Order details:
Clevis type 61 .. 1.

TURNBUCKLE TYPE 62 ROD COUPLING TYPE 64

Turnbuckle type 62 D9 19 to 62 50 15

Material: S235JRG2
drop forged
from load group 10:
S355J2G3
Flame cut design



① one end right-hand thread,
the other left-hand.

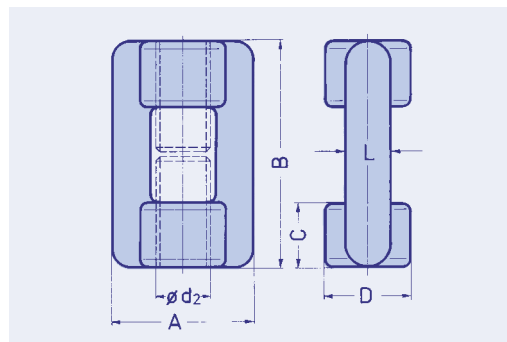
| Type | A | B | C | SW | Ød2① | E | L | x | Weight (kg) |
|----------|-----|-----|----|-----|-------|-----|--------|-----|-------------|
| 62 D9 19 | 30 | 125 | 18 | 16 | M10 | 35 | 9x 8 | 45 | 0.15 |
| 62 29 12 | 34 | 125 | 21 | 18 | M12 | 35 | 11x 9 | 45 | 0.20 |
| 62 39 19 | 42 | 150 | 27 | 24 | M16 | 50 | 14x11 | 50 | 0.40 |
| 62 49 19 | 52 | 170 | 33 | 30 | M20 | 60 | 17x14 | 55 | 0.70 |
| 62 59 19 | 62 | 240 | 39 | 36 | M24 | 80 | 22x17 | 80 | 1.20 |
| 62 69 12 | 74 | 255 | 45 | 46 | M30 | 85 | 23x20 | 85 | 1.80 |
| 62 79 12 | 86 | 295 | 55 | 55 | M36 | 95 | 28x23 | 100 | 3.00 |
| 62 89 12 | 104 | 330 | 63 | 65 | M42 | 100 | 32x27 | 115 | 4.80 |
| 62 99 12 | 130 | 355 | 75 | 75 | M48 | 105 | 40x35 | 125 | 7.80 |
| 62 10 15 | 110 | 300 | 60 | 80 | M56x4 | 80 | 80x23 | 110 | 10.00 |
| 62 20 15 | 130 | 320 | 70 | 90 | M64x4 | 80 | 90x28 | 120 | 15.00 |
| 62 30 15 | 140 | 330 | 75 | 100 | M68x4 | 80 | 100x30 | 125 | 18.00 |
| 62 40 15 | 150 | 390 | 80 | 100 | M72x4 | 90 | 100x33 | 150 | 22.00 |
| 62 50 15 | 165 | 410 | 90 | 120 | M80x4 | 90 | 120x37 | 160 | 32.00 |

Order details:

Turnbuckle type 62 .. 1.

Rod coupling type 64 D9 19 to 64 50 15

Material: S235JRG2
drop forged
from load group 10:
S355J2G3
Flame cut design



| Type | A | B | C | D | Ød2 | L | Weight (kg) |
|----------|-----|-----|----|-----|-------|--------|-------------|
| 64 D9 19 | 34 | 45 | 15 | 21 | M10 | 11x 9 | 0.1 |
| 64 29 18 | 34 | 45 | 15 | 21 | M12 | 11x 9 | 0.1 |
| 64 39 18 | 42 | 60 | 20 | 27 | M16 | 14x11 | 0.2 |
| 64 49 18 | 52 | 75 | 25 | 32 | M20 | 17x14 | 0.5 |
| 64 59 18 | 62 | 90 | 30 | 39 | M24 | 22x17 | 0.7 |
| 64 69 18 | 74 | 105 | 35 | 45 | M30 | 23x20 | 1.2 |
| 64 79 18 | 86 | 120 | 40 | 55 | M36 | 28x23 | 1.6 |
| 64 89 18 | 104 | 150 | 50 | 63 | M42 | 32x27 | 2.6 |
| 64 99 18 | 130 | 180 | 60 | 75 | M48 | 40x35 | 5.1 |
| 64 10 15 | 110 | 190 | 60 | 80 | M56x4 | 80x23 | 7.0 |
| 64 20 15 | 130 | 220 | 70 | 90 | M64x4 | 90x28 | 11.0 |
| 64 30 15 | 140 | 240 | 75 | 100 | M68x4 | 100x30 | 14.0 |
| 64 40 15 | 150 | 250 | 80 | 100 | M72x4 | 100x33 | 15.0 |
| 64 50 15 | 165 | 280 | 90 | 120 | M80x4 | 120x37 | 23.0 |

Order details:

Rod coupling 64 .. 1.

CONNECTING RODS TYPE 63 TO 67

6

Piping systems are embedded in load chains where connecting rods form an indispensable component. When selecting them, special attention must be paid to quality to prevent these seemingly simple units from becoming the weakest link in the chain. Decisive factors for their loading capacity are, beside adequate dimensions, material quality and design.

Applications

Threaded rods and tie rods connect support components to each other to bridge installation heights. In conjunction with connecting components they can be used as rigid supports, and in elastic load chains can be used with spring and constant hangers.

Materials and loadings

For the attachment rods, only materials with guaranteed mechanical properties, with good homogeneity and sufficient cold ductility are used. The permissible loads correspond to the load sufficient table for statically defined components (see **Technical specifications** page 0.5).

Rolled threads

All threads are manufactured using a rolling process. Thread rolling does not sever milling fibres as in thread cutting. By means of this thread rolling process the material is made to flow and thereby plastically formed. In this way, additional strengthening of the surface is achieved, free of notches and offering high surface quality.

In this way, frictional resistance is reduced, with a favorable effect on the adjustment of the rods under loading. In addition, additional reserves for the bending and tensile strength properties result from this by comparison with the design calculations.

Types

Fully threaded rods type 67 up to M48 and tie rods type 66 (from M20) are available in 500mm length increments from 500mm up to 3000mm. Tie rods are threaded 300mm at one end and 600mm at the other. The shorter thread is for adjustment and, for example, for connection to a variable or

constant hanger. The longer one is the fitting length and can be cut on site according to installation length.

Standard lengths

In general, larger tolerance ranges in the building structure of plants frequently lead to problems when lengths cut to measure for the connecting rods are used; they often prove to be too short. Offering more flexibility in application, connecting rods in standard lengths have come into increasing use. Fitting can be simply carried out with hanging rods already mounted at the upper end. Awkward measurement involving the risk of errors is thereby avoided. Structural tolerances can be favorably compensated.

Length adjustment

Tie rods type 65 with left/right hand threads are always used together with turnbuckle type 62 and form standard lengths. They are designed for length adjustment and load-actuated presetting of load chains. All other thread connections are exclusively right-hand and have to be locked using hexagon nut type 63.

Corrosion protection

All rods are electrogalvanized as standard (coat thickness 15µm, chromated yellow for metric and white for UNC standards). Hot dip galvanizing is available on request.

Certification

Material certification can be supplied for all components on request.

Special advantages:

- materials with guaranteed properties
- rolled threads
- notch-free surfaces
- electrogalvanized finish
- standard lengths
- in-house manufacture



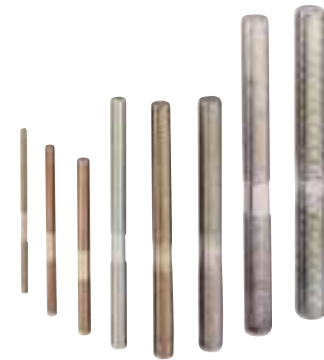
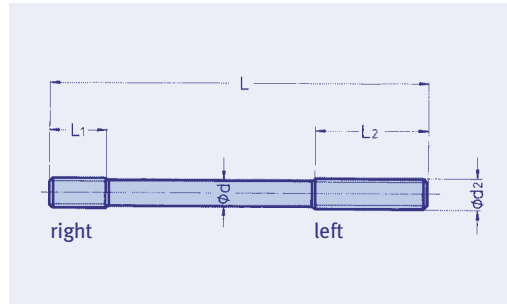
Manufacturing process for threaded rods.

TIE ROD LR, TYPE 65 STUD BOLT, TYPE 67 HEXAGON NUTS, TYPE 63

Tie rod left/right type 65 D1 19 to 65 50 13

Material:
M10 - M16: S235JRG2
from M20: S355JO

LISEGA threaded rod should only be replaced in kind



| Type | Ød | Ød2 | L | L1 right | L2 left | Weight (kg) |
|----------|-------|-------|-----|----------|---------|-------------|
| 65 D1 19 | 8.75 | M10 | 250 | 80 | 130 | 0.1 |
| 65 21 13 | 10.74 | M12 | 250 | 80 | 130 | 0.2 |
| 65 31 13 | 14.54 | M16 | 250 | 80 | 130 | 0.3 |
| 65 41 13 | 18.20 | M20 | 250 | 80 | 130 | 0.5 |
| 65 51 13 | 21.85 | M24 | 350 | 120 | 190 | 1.0 |
| 65 61 13 | 27.55 | M30 | 350 | 120 | 190 | 1.6 |
| 65 71 13 | 33.15 | M36 | 350 | 120 | 190 | 2.4 |
| 65 81 13 | 38.91 | M42 | 450 | 160 | 220 | 4.2 |
| 65 91 13 | 44.53 | M48 | 450 | 160 | 220 | 5.5 |
| 65 10 13 | 53.22 | M56x4 | 550 | 200 | 270 | 9.6 |
| 65 20 13 | 61.20 | M64x4 | 550 | 200 | 270 | 12.7 |
| 65 30 13 | 65.20 | M68x4 | 550 | 200 | 270 | 14.4 |
| 65 40 13 | 69.20 | M72x4 | 600 | 220 | 300 | 17.7 |
| 65 50 13 | 77.20 | M80x4 | 600 | 220 | 300 | 22.1 |

Order details:

Tie rod LR type 65 .. 1.

Hexagon nut type 63 D9 29 to 63 50 28

Material: grade 8
Hexagon nuts as counter nuts for tie rods and threaded rods M10 to M80x4.



| Type | Size | Weight (kg) |
|----------|-------|-------------|
| 63 D9 29 | M10 | 0.01 |
| 63 29 28 | M12 | 0.02 |
| 63 39 28 | M16 | 0.03 |
| 63 49 28 | M20 | 0.06 |
| 63 59 28 | M24 | 0.11 |
| 63 69 28 | M30 | 0.22 |
| 63 79 28 | M36 | 0.39 |
| 63 89 28 | M42 | 0.65 |
| 63 99 28 | M48 | 0.98 |
| 63 10 28 | M56x4 | 1.40 |
| 63 20 28 | M64x4 | 1.90 |
| 63 30 28 | M68x4 | 2.25 |
| 63 40 28 | M72x4 | 2.60 |
| 63 50 28 | M80x4 | 3.40 |

Order details:

Hexagon nut type 63 .. 2.

Stud bolt type 67 D1 19 to 67 91 13

Material:
M10 - M16: S235JRG2
from M20: S355JO

LISEGA threaded rod should only be replaced in kind

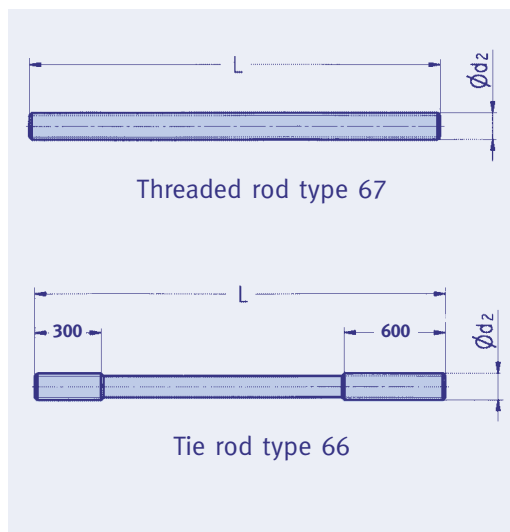


| Type | L | Ød2 | Weight (kg) |
|----------|-----|-----|-------------|
| 67 D1 19 | 30 | M10 | 0.02 |
| 67 21 13 | 35 | M12 | 0.03 |
| 67 31 13 | 50 | M16 | 0.07 |
| 67 41 13 | 60 | M20 | 0.12 |
| 67 51 13 | 75 | M24 | 0.22 |
| 67 61 13 | 90 | M30 | 0.42 |
| 67 71 13 | 110 | M36 | 0.75 |
| 67 81 13 | 125 | M42 | 1.17 |
| 67 91 13 | 145 | M48 | 1.77 |

Order details:

Stud bolt type 67 .. 1.

TIE ROD, TYPE 66 THREADED ROD, TYPE 67



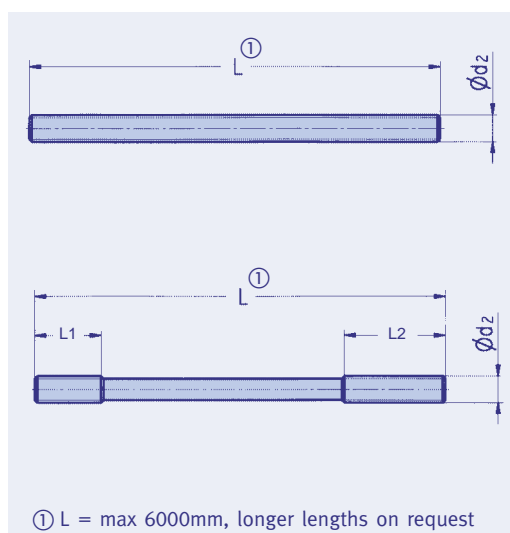
Material:

M10 - M16: S235JRG2
from M20: S355JO

LISEGA threaded rod should only be replaced in kind

| Ød2 | Type at L= | | | | | | Weight (kg/m) |
|------|------------|----------|----------|----------|----------|----------|---------------|
| | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | |
| M 10 | 67 D2 19 | 67 D3 19 | 67 D4 19 | 67 D5 19 | 67 D6 19 | 67 D7 19 | 0.5 |
| M 12 | 67 22 13 | 67 23 13 | 67 24 13 | 67 25 13 | 67 26 13 | 67 27 13 | 0.7 |
| M 16 | 67 32 13 | 67 33 13 | 67 34 13 | 67 35 13 | 67 36 13 | 67 37 13 | 1.3 |
| M 20 | 67 42 13 | 67 43 13 | 67 44 13 | 67 45 13 | 66 46 13 | 66 47 13 | 2.0 |
| M 24 | 67 52 13 | 67 53 13 | 67 54 13 | 67 55 13 | 66 56 13 | 66 57 13 | 2.9 |
| M 30 | 67 62 13 | 67 63 13 | 67 64 13 | 67 65 13 | 66 66 13 | 66 67 13 | 4.7 |
| M 36 | 67 72 13 | 67 73 13 | 67 74 13 | 67 75 13 | 66 76 13 | 66 77 13 | 6.8 |
| M 42 | 67 82 13 | 67 83 13 | 67 84 13 | 67 85 13 | 66 86 13 | 66 87 13 | 9.3 |
| M 48 | 67 92 13 | 67 93 13 | 67 94 13 | 67 95 13 | 66 96 13 | 66 97 13 | 12.2 |

Standard lengths avoid problems from undersized installation lengths and allow flexibility by cutting to length on site if required.



Connecting rods from M56x4 upwards can be ordered both as threaded rods type 67 or as tie rods type 66 with individual rolled thread lengths.

Order details:

Threaded rod / Tie rod type ...

(at M56x4:) Threaded rod / Tie rod type ...

L = ...

L₁ = ...

L₂ = ...

| Ød2 | Type | | Weight (kg/m) |
|--------|--|----------|---------------|
| | (L / L ₁ / L ₂ please note at order) | | |
| M 56x4 | 66 10 13 | 67 10 13 | 17.5 |
| M 64x4 | 66 20 13 | 67 20 13 | 23.1 |
| M 68x4 | 66 30 13 | 67 30 13 | 26.2 |
| M 72x4 | 66 40 13 | 67 40 13 | 29.5 |
| M 80x4 | 66 50 13 | 67 50 13 | 36.8 |