

Ostrava Thread Bars Micropile



LIBERTY Ostrava
www.libertysteelgroup.com



LIBERTY Ostrava is an integrated steel business with an annual production capacity of approximately 3.6 million tonnes serving construction, machinery and oil & gas industries.

The company is a domestic leader in the manufacturing of road barriers and tubes. In addition to the Czech market, it supplies its products to more than 40 countries around the world. Together with its subsidiaries in Ostrava, the company has 6,000 employees. The company

manufactures its products with a minimum possible environmental footprint. It is part of LIBERTY Steel Group, which is part of GFG Alliance, a collection of global businesses and investments owned by Sanjeev Gupta and his family. The Alliance is structured into three core industrial pillars: LIBERTY Steel Group, ALVANCE Aluminium Group and SIMEC Energy Group. Headquartered in London, GFG Alliance employs 35,000 people, across 10 countries and has revenues of USD \$20bn.

Liberty Ostrava Facilities

- 3 coke oven batteries
- 5 sinter belts
- 3 blast furnaces
- 4 tandem furnaces
- 3 continuous casting machines
- 6 rolling mills (incl. hot-strip mill, big and small Stiefel pipe mills, wire rod mill, heavy section mill, fine & medium section mill)
- Mine support and road barrier lines

Main Products

Hot rolled coils, sheets and strips, road barriers, merchant bars and sections, wire rods, tubular steels, mine supports, engineering products, transformer cores, threaded bars, rebars

Key Markets

Construction, machinery and automotive

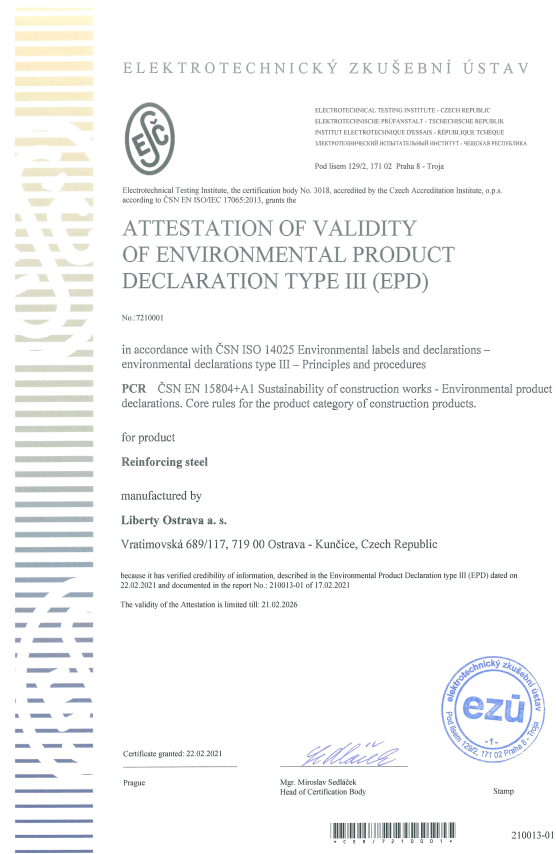
Certification

ISO 9001

ISO 14001

OHSAS 18001

ISO 50001



Actual certificates are available on the link:

<https://www.libertysteelgroup.com/cz/products/product-certification/?lang=en>

<https://www.libertysteelgroup.com/cz/products/epd/?lang=en>

Ostrava Thread Bars

Delivery Statement:

Hot rolled bar with right-handed and left-handed thread ribs.

Mechanical properties for 670/800:

Strength: $R_{e, nom} = 670$ MPa; $R_{m, nom} = 800$ MPa

Elongation: $A_{gt} = 5\%$

Mechanical properties for 550/620:

Strength: $R_{e, nom} = 550$ MPa; $R_{m, nom} = 620$ MPa

Elongation: $A_{gtmin} = 5\%$

Weldability:

For structural welding, specific procedures for high carbon steel must be respected.

Application:

Tightened coupling splices and anchorages

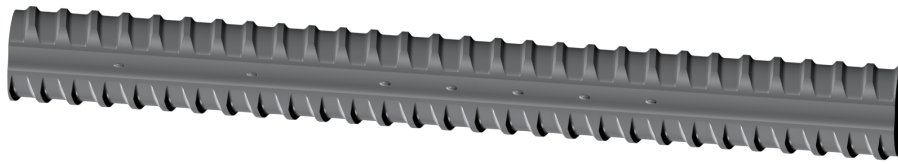
Length: standard 12 m - 15 m - 0 / + 0.3 m, other lengths upon agreement with supplier.

Density: 7.85 kg/dm³

Inspection:

Mill certificate 3.1 according to EN 10204.

OTB 670/800 with right-hand thread



OTB 670/800

Nominal Diameter d [mm]	Outer Diameter d_a [mm]	Yield Load $F_{e, nom}$ [kN]	Ultimate Load $F_{m, nom}$ [kN]	Yield Strength ^{1),2)} $R_{e, nom}$ [MPa]	Tensile Strength ¹⁾ $R_{m, nom}$ [MPa]	Elongation A_{gt} [%]	Nominal Cross section A [mm ²]	Weight [kg/m]
22	24.2	255	304	670	800	5	380	2.98
25	27.5	329	393	670	800	5	491	3.85
28	31.2	413	493	670	800	5	616	4.84
30	33.5	474	566	670	800	5	707	5.55
35	39.2	645	770	670	800	5	962	7.55
43	47.9	973	1162	670	800	5	1452	11.40
50	54.6	1315	1570	670	800	5	1963	15.41
57.5	62.8	1740	2078	670	800	5	2597	20.39
63.5	69.0	2122	2534	670	800	5	3167	24.86
75	81.5	2960	3534	670	800	5	4418	34.68

OTB 550/620 with left-hand thread



OTB 550/620

Nominal Diameter d [mm]	Outer Diameter d_a [mm]	Yield Load $F_{e, nom}$ [kN]	Ultimate Load $F_{m, nom}$ [kN]	Yield Strength ^{1),2)} $R_{e, nom}$ [MPa]	Tensile Strength ¹⁾ $R_{m, nom}$ [MPa]	Elongation A_{gt} [%]	Nominal Cross section A [mm ²]	Weight [kg/m]
25	27.9	270	304	550	620	5	491	3.85
28	31.2	339	382	550	620	5	616	4.83
32	35.7	442	499	550	620	5	804	6.31
40	44.6	691	779	550	620	5	1257	9.87
50	55.6	1080	1217	550	620	5	1963	15.41
57.5	62.8	1428	1610	550	620	5	2597	20.39
63.5	69.0	1742	1963	550	620	5	3167	24.86
75	81.5	2430	2739	550	620	5	4418	34.68

1) 5% -fractile

2) Yield strength R_e corresponds to $R_{p0.2}$, 0.2% proof strength

Corrosion Protection of Micropiles

In general, the thread bars in the center of the micropile is covered by a layer of cement mortar that passivates the steel surface, provided crack widths are limited and there is an absence of spalling of cover of cement mortar in service. Minimum cover of cement mortar for micropiles is 20 mm on the thread bar. Corrosion protection of the anchorage at the pile head is by concrete of the foundation.

1. Temporary micropile (lifetime less than 2 years, depending on the rate of corrosion)

Temporary micropiles are protected against corrosion by at least 20 mm thick cover of cement mortar on the thread bar. The minimum cover of cement mortar is ≥ 15 mm. The thickness of the cement mortar is ensured by spacers, spacing $\leq 3,0$ m. The pile neck at the area of the joint ground to foundation is protected.

2. Semi-Permanent Micropile (lifetime 2 - 50 years, depending on the rate of corrosion)

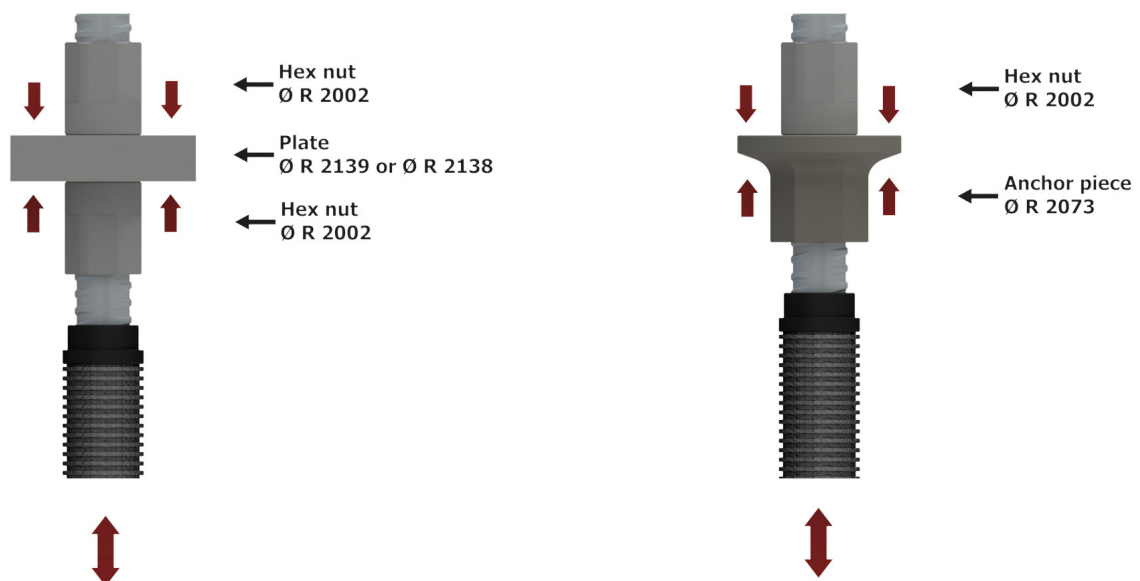
For cover of cement mortar on the thread bar is applied similar rules as for Temporary micropiles. To ensure the intended working life of the pile foundation the following procedures are applied. Definition of corrosion rates for sacrificial corrosion dependent on the ground conditions for bare thread bars, disregarding the system-inherent encapsulation by a body of cement mortar. Definition of corrosion rates for sacrificial corrosion dependent on the ground conditions for hot deep galvanized thread bars, disregarding the system-inherent encapsulation by a body of cement mortar. The applied thickness of the zinc coating usually is $\geq 150 \mu\text{m}$. If zinc coating of a smaller thickness is applied, this is taken into consideration for determining the losses in cross sectional area. The pile neck at the area of the joint ground to foundation is protected.

3. Permanent Micropile with standard corrosion protection - Cement grout cover (lifetime up to 100 years)

Standard corrosion protection – is achieved by encapsulation with a body of cement mortar. Dependent on the exposure classes according to EN 206, the required cover of cement mortar is defined based on relevant geotechnical standards. The crack widths under tensile load are thereby limited to $\leq 0,2$ mm.

4. Permanent micropile with double corrosion protection - DCP acc. to EN 1537 (lifetime up to 100 years)

Double corrosion protection – DCP, permanent micropile according to EN 1537 – are protected against corrosion with a corrugated plastic sheathing with thickness ≥ 1 mm and inner cement grout layer at least 5 mm between thread bar and corrugated plastic sheathing. The thread bar is centered in the corrugated plastic sheathing with a plastic cord or plastic spacer. Grouting of the corrugated plastic sheathing is carried out at the manufacturing plant according to defined operating procedures.



Double Corrosion Protection System



DCP - micropiles are fully cement grouted bars. Full corrosion protection is achieved by complete HDPE or PVC encapsulation of the bar and by encasing the anchorage (if required). In addition, the cement grout fulfils a chemically active protective function. DCP system consists of:

- Ostrava Thread Bar (OTB)
- Internal spacers fixed to the OTB to centralize it in the HDPE sheathing
- Inner cement grout
- HDPE or PVC corrugated sheathing
- External spacers fixed to the external sheathing to ensure a minimum of 10 mm grout
- External grout and vent tubes
- Grout

Coupling

The coupling system is used to couple lengths of bar. In case of tensioning or compression/tension, the couplers should be torqued with lock nuts to eliminate slip between bar and coupler and so to avoid big cracks and movement.

The coupling consists of:

- OTB Bar
- Coupler with lock nuts
- Corrosion protection of the coupler (heat shrink sleeve)

Quality Assurance

Liberty Ostrava a.s. is certified according to ISO 9001: 2016. In addition, the internal control procedures are ensuring via nondestructive and destructive testing the integrity of all the system components.

Handling and site transport

- Care should be taken when transporting the piles to the fabrication yard and from the yard to the borehole.
- The piles should be adequately supported (bracing or support at a maximum distance of 1,5 – 3,0 m depending on diameter of bar) so as not to damage the pre-grouting. (To avoid bending the bar by lifting it, check carefully and if necessary, reduce distance of support)
- During transport, the piles should be laid flat on suitable transport and with supports between the layers of piles. Care should be taken not to knock the piles to avoid that the pre-grouting cracks.
- The piles can be lifted and transported by crane with a brace or lifting device on the air-sided end of the bar (ring nut etc.). Take care that by lifting the bar does not bend too much and the end does not slip on the ground.

Execution of Micropiles

Drilling

A suitable drilling method shall be chosen considering:

- the ground conditions
- the equipment that the drilling contractor currently uses and proposes suitable

Minimum drill hole diameter

Required drill hole diameter for Single Corrosion protected (SCP) and Double Corrosion protected (DCP) micropiles depends on the ground conditions and drilling equipment setup.

Drilling Method:

- The drilling method shall be chosen to cause the minimum ground modification and disturbance possible and to allow the designed pile resistance to be mobilized.
- Prevent collapse of the borehole wall during drilling and installation of pile. The boreholes shall be cased, unless it is demonstrated on site that the uncased boreholes are stable and that no earth can break off into the borehole when the pile is inserted.
- Minimize loosening of the surrounding ground
- Minimize softening of the borehole walls in cohesive soils and degradable rocks
- Drilling fluid chosen shall have no adverse effect on the micropile.

Installation:

The micro pile should be installed as soon as possible after drilling to minimize the risk of hole collapse and redrilling requirements. The borehole length should be checked upon completion and should not be shorter than required.

Homing of the micropile:

- Once the borehole has been drilled to the appropriate diameter and thoroughly flushed, commence installing the pile immediately.
- Prepare the necessary pile pieces ready by the borehole (if more than one piece). The pieces should be well

protected and supported off the ground to avoid dirt and damage. Care should be taken that drilling rigs or other site equipment do not pass near the anchor pieces and cause possible damage.

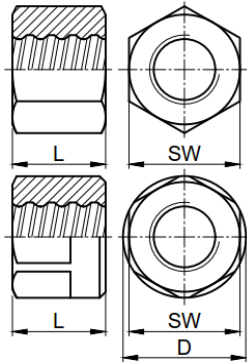
- Slowly lift the micro pile and take it into the borehole.
- Make sure that the corrugated sheathing does not drag at the relatively sharp edges of the flange.
- Introduce the lower end (at the end cap end) slowly into the hole until the cleaned end is at the borehole mouth.
- Screw the coupler and lock nuts on by taking care that exactly 50 % of the coupler is screwed on the bar. If it is only a compression pile, a contact coupler without any locknut can be used. Paint marks previously put on the bar will help with this phase.
- Holding the coupler and lower anchor piece firmly in place, screw the next piece of bar in place. Ensure that coupler is equally placed over the two bar pieces and does not rotate during the screwing operation.
- Tighten the coupler and bars together and torque the lock nuts
- The coupler shall be protected with heat shrink sleeve.
- Pursuant to norms the hollow space between the grout and splice shall be completely grouted with the plastic sealing tape "Densoplast" on both sides of the splice, before the heat shrink sleeve is shrunk on.

Grouting of the micropiles

- The original materials for the cement grout are cement and mixing water as specified by EN 14119
- The water/cement ratio should be max 0,55. In cohesive soils the lowest possible ratio shall be chosen. The cement grout must be mixed mechanically and must not segregate and lump before it is injected.
- Grout injection should be carried out as soon as possible after the micropile installation. Fill the boreholes with cement grout from the ground end via the drill casings or grout tubes.

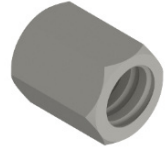
Accessories for OTB 670/800

Hexagonal Nut

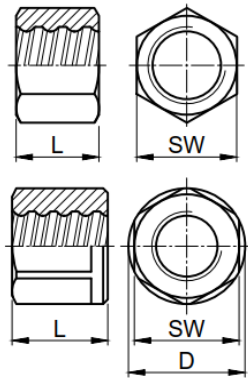


R2002

Ø [mm]	Weight [kg]	SW [mm]	L [mm]	D [mm]
22R	0.40	41	50	-
25R	0.55	46	55	-
28R	0.69	50	60	-
30R	0.92	55	65	-
35R	1.40	65	70	-
43R	2.75	80	90	-
50R	2.65	80	100	-
57R	4.27	90	120	102
63R	4.53	100	110	108
75R	4.08	100	130	108



Lock Nut, Long



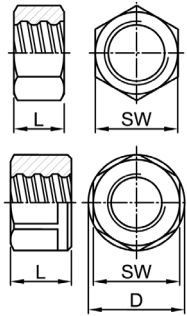
R2003

Ø [mm]	Weight [kg]	SW [mm]	L [mm]	D [mm]
22R	0.24	36	45	-
25R	0.35	41	50	-
28R	0.49	46	55	-
30R	0.63	50	60	-
35R	0.77	55	65	-
43R	1.63	70	80	-
50R	2.38	80	90	-
57R	3.42	90	100	102
63R	5.05	100	115	114
75R	3.73	100	120	108



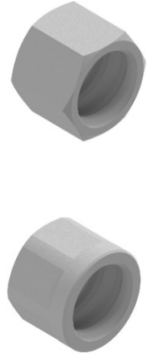
Accessories for OTB 670/800 continued...

Lock Nut, Short

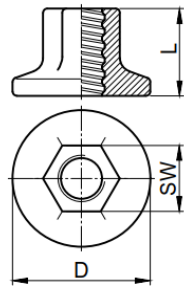


R2040

Ø [mm]	Weight [kg]	SW [mm]	L [mm]	D [mm]
22R	0.12	36	22	-
25R	0.15	41	22	-
28R	0.26	46	30	-
30R	0.32	50	30	-
35R	0.47	55	40	-
43R	1.01	70	50	-
50R	1.32	80	50	-
57R	1.93	90	60	102
63R	3.03	100	70	114
75R	2.46	100	80	108

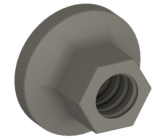


Anchor Piece

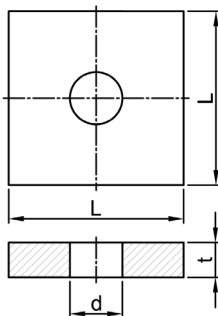


R2073

Ø [mm]	Weight [kg]	SW [mm]	L [mm]	D [mm]
22R	0.43	36	45	65
25R	0.67	41	50	75
28R	0.91	46	55	85
30R	1.10	50	60	90
35R	1.82	60	70	105
43R	2.95	70	85	130
50R	4.48	80	100	150
57R	7.42	90	115	175
63R	9.35	100	125	190
75R	16.82	120	150	230

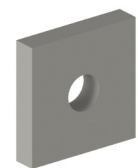


Steel Plate with Additional Reinforcement



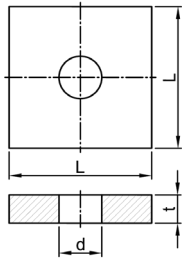
R2138

Ø [mm]	Weight [kg]	L [mm]	t [mm]	d [mm]
22R	0.91	80	20	27
25R	1.16	90	20	30
28R	1.41	100	25	34
30R	2.17	110	25	36
35R	2.79	125	30	42
43R	4.84	150	35	50
50R	7.64	175	40	60
57R	12.88	200	45	67
63R	17.31	220	50	74
75R	31.53	260	65	86



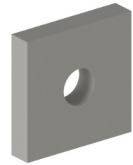
Accessories for OTB 670/800 continued...

Steel Plate without Additional Reinforcement

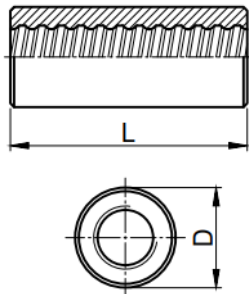


R2139

Ø [mm]	Weight [kg]	L [mm]	t [mm]	d [mm]
22R	1.18	90	20	27
25R	1.46	100	25	30
28R	2.20	110	25	34
30R	2.63	120	25	36
35R	4.29	140	30	42
43R	7.40	170	35	50
50R	13.13	200	45	60
57R	19.38	230	50	67
63R	24.06	245	55	74
75R	43.02	290	70	86

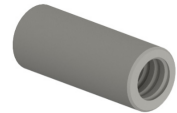


Coupler

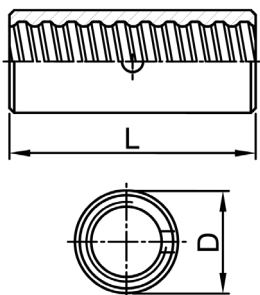


R3003

Ø [mm]	Weight [kg]	D [mm]	L [mm]
22R	0.70	40	110
25R	0.96	45	120
28R	1.37	50	140
30R	1.82	55	150
35R	2.94	65	170
43R	5.28	80	200
50R	6.90	90	210
57R	10.39	102	250
63R	15.70	114	300
75R	9.39	108	260

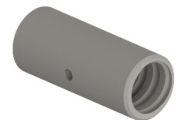


Contact Coupler



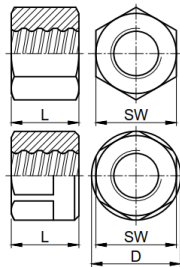
R3006

Ø [mm]	Weight [kg]	D [mm]	L [mm]
22R	0.22	32	75
25R	0.43	40	80
28R	0.62	45	90
30R	0.55	45	90
35R	0.81	50	120
43R	2.09	65	160
50R	2.25	70	170
57R	3.60	83	180
63R	4.46	90	200
75R	5.95	102	230



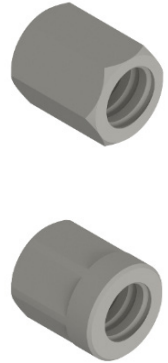
Accessories for OTB 550/620

Hexagonal Nut

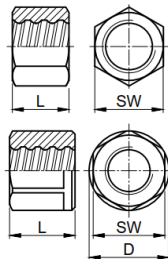


L2002

Ø [mm]	Weight [kg]	SW [mm]	L [mm]	D [mm]
25L	0.35	41	50	-
28L	0.48	46	55	-
32L	0.79	55	60	-
40L	1.20	65	70	-
50L	2.17	80	85	-
57L	3.42	90	100	102
63L	3.58	100	135	114
75L	3.00	100	100	108

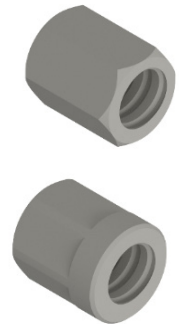


Lock Nut, Long

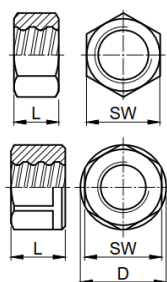


L2003

Ø [mm]	Weight [kg]	SW [mm]	L [mm]	D [mm]
25L	0.25	41	40	-
28L	0.28	41	45	-
32L	0.48	50	50	-
40L	0.84	60	65	-
50L	2.04	80	80	80
57L	2.77	90	80	102
63L	3.44	90	115	102
75L	2.42	100	80	108

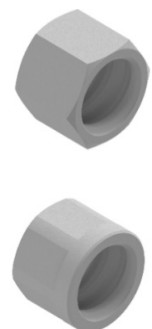


Lock Nut, Short



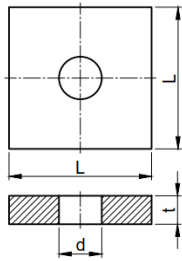
L2040

Ø [mm]	Weight [kg]	SW [mm]	L [mm]	D [mm]
25L	0.14	41	20	-
28L	0.14	41	25	-
32L	0.29	50	30	-
40L	0.45	60	35	-
50L	1.27	80	50	-
57L	2.77	90	60	102
63L	2.26	90	75	102
75L	2.42	100	80	108



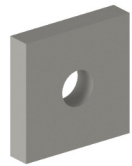
Accessories for OTB 550/620 continued...

Steel Plate with Additional Reinforcement

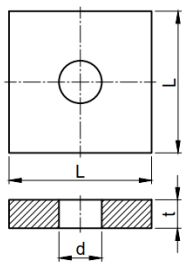


L2138

Ø [mm]	Weight [kg]	L [mm]	t [mm]	d [mm]
25L	0.89	80	20	30
28L	1.14	90	20	33
32L	1.74	100	25	38
40L	3.27	125	30	47
50L	5.87	155	35	58
57L	9.13	180	40	65
63L	12.69	200	45	72
75L	20.33	230	55	86

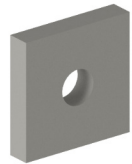


Steel Plate without Additional Reinforcement

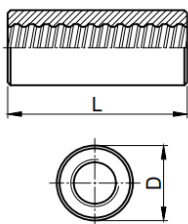


L2139

Ø [mm]	Weight [kg]	L [mm]	t [mm]	d [mm]
25L	1.16	90	20	30
28L	1.79	100	25	33
32L	2.15	110	25	38
40L	4.91	140	35	47
50L	8.79	175	40	58
57L	12.96	200	45	65
63L	17.40	220	50	72
75L	29.10	260	60	86

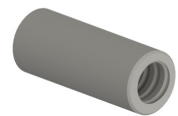


Coupler

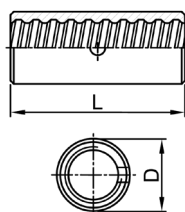


L3003

Ø [mm]	Weight [kg]	D [mm]	L [mm]
25L	0.65	40	115
28L	0.90	45	125
32L	1.40	52	140
40L	2.50	65	160
50L	4.80	80	200
57L	8.81	100	230
63L	10.00	102	260
75L	8.67	108	240

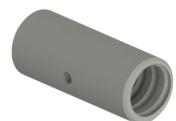


Contact Coupler



L3006

Ø [mm]	Weight [kg]	D [mm]	L [mm]
25L	0.30	36	80
28L	0.40	40	85
32L	0.50	45	90
40L	0.82	54	120
50L	1.09	63	160
57L	3.36	83	170
63L	4.28	90	200
75L	5.33	102	210



Contact with the mill

Czech Republic and Other Countries

Liberty Commercial Czech Republic k.s.

Vratimovská 689/117, 719 00 Ostrava (CZ)

ID: 05433266

VAT: CZ05433266

E: sales.ostrava@libertysteelgroup.com

T: +420 595 687 787

www.libertyostrava.cz

Germany

Liberty Commercial Germany GmbH

Am Brüll 17, 40878 Ratingen (DE)

E: matthias.scheibe@libertysteelgroup.com

T: +49 162 42 78 799

Poland

Liberty Commercial PL Sp. z o. o.

Francuska 36, 3rd floor, 40-506 Katowice (PL)

E: lcpl.biuro@libertysteelgroup.com

T: +48 32 661 98 90



Reach us through our new LSCE APP

To download the LSCE App please scan the QR Code below and let us become an inseparable part of your business



For further information visit www.libertysteelgroup.com
Revision: January 2023

