

INSTYTUT TECHNIKI BUDOWLANEJ

P L 0 0 – 6 1 1 W A R S A W, u l . F I L T R O W A 1

Phone: (48 22) 825-04-71; (48 22) 825-76-55; fax (48 22) 825-52-86

Member of the European Union of Agrément in the Construction Industry—UEAtc
Member of European Organisation for Technical Approvals

Series: TECHNICAL APPROVALS

ITB TECHNICAL APPROVAL

AT-15-8948/2012

Pursuant to the Ordinance of the Minister of Infrastructure of 8 November 2004 on Technical Approvals and Organizational Entities authorized to issue them (Journal of Laws "Dziennik Ustaw" No. 249, item 2497), following the approval procedure conducted in the Building Research Institute in Warsaw according to the application made by the company:

“GÓRALMET” M i J. Góral Sp. J.
Ul. Krakowska 68
32-860 Czchów

It is hereby certified that the products named below:

Double sided screw connectors GÓRALMET

are suitable for use in the construction industry in the scope of and in compliance with the rules as defined in the Enclosure constituting an integral part of the ITB Technical Approval.

Expiry date:
7 September 2017

Enclosure:
General and technical provisions

DIRECTOR
under the authority of Deputy Director for
Co-operation with the Economy
Marek Kaproń

Warsaw, 7 September 2012

The Technical Approval ITB AT-15-8948/2012 document contains 25 pages. The text of this document may only be duplicated as a whole. Publication or distribution of fragments of the text of the Technical Approval in any other form requires a written arrangement with the Building Research Institute.



ENCLOSURE**GENERAL AND TECHNICAL PROVISIONS****TABLE OF CONTENTS**

1. SUBJECT OF THE APPROVAL.....	3
2. INTENDED USE, SCOPE AND CONDITIONS OF APPLICATION	4
3. TECHNICAL PROPERTIES. REQUIREMENTS.....	5
3.1. Materials.....	5
3.2. Products.....	5
4. PACKAGING, STORAGE AND TRANSPORT.....	6
5. CONFORMITY ASSESSMENT.....	6
5.1. General Conditions.....	6
5.2. Initial Type-Testing.....	7
5.3. Factory Production Control.....	7
5.4. Tests of Finished Products.....	8
5.5. Frequency of Testing.....	8
5.6. Methods of Testing.....	8
5.7. Taking Samples for Testing.....	9
5.8. Evaluation of Test Results	9
6. FORMAL AND LEGAL PROVISIONS.....	9
7. EXPIRY DATE.....	10
ADDITIONAL INFORMATION.. ..	11
FIGURES AND TABLES.....	13



1. SUBJECT OF THE APPROVAL

The subject of this Technical Approval ITB are double sided screw connectors GÓRALMET used for making tie-beams of metal and wooden building constructions, manufactured by the company "GÓRALMET" M. i J. Góral Sp. J., ul. Krakowska 68, 32-860 Czchów.

The set of connectors consists of:

- tube tension nuts GM SR-K with thread M 5 ÷ M 42, according to figure nr 1 (trade name: turnbuckle body GM SR-K),
- open tension nuts GM SO-K with thread M 5 ÷ M 42, according to figure nr 2 (trade name: turnbuckle body GM SO-K),
- double sided screw connectors GM SR-PP with a tube nut and two threaded straight rods, with thread M 5 ÷ M 42, according to figure nr 3 (trade name: turnbuckle GM SR-PP),
- double sided screw connectors GM SR-SS with a tube nut and two threaded rods ended with a fork joint, with a thread M 6 ÷ M 24, according to figure nr 4 (trade name: turnbuckle GM SR-SS),
- double sided screw connectors GM SR-OO with a tube nut and two threaded rods ended with an eye hook, with a thread M 5 ÷ M 36, according to figure nr 5 (trade name: turnbuckle GM SR-OO),
- double sided screw connectors GM SR-HH with a tube nut and two threaded rods ended with an open hook, with a thread M 5 ÷ M 36, according to figure nr 6 (trade name: turnbuckle: GM SR-HH),
- double sided screw connectors GM SR-HO with a tube nut and two threaded rods, one ended with an eye hook, and the other with an open hook, with a thread M 5 ÷ M 36, according to figure nr 7 (trade name: turnbuckle GM SR-HO),
- double sided screw connectors GM SO-PP with an open nut and two threaded rods with a thread M 5 ÷ M 42, according to figure nr 8 (trade name: turnbuckle GM SO-PP),



- double sided screw connectors GM SO-OO with an open nut and two threaded rods ended with an eye hook, with a thread M 5 ÷ M 36, according to figure nr 9 (trade name: turnbuckle GM SO-OO),
- double sided screw connectors GM SO-HH with an open nut and two threaded rods ended with an open hook, with a thread M 5 ÷ M 36, according to figure nr 10 (trade name: turnbuckle GM SO-HH),
- double sided screw connectors GM SO-HO with an open nut and two threaded rods, one ended with an eye hook, and the other with an open hook, with a thread M 5 ÷ M 36, according to figure nr 11 (trade name: turnbuckle GM SO-HO).

Connectors GÓRALMET are made of carbon steel and protected against corrosion by being covered with a electrolytic zinc coating. Tube and open tension nuts are made with a technology of plastic treatment.

The required technical properties of the double sided screw connectors GÓRALMET, are specified in point 3.

2. INTENDED USE, SCOPE AND CONDITIONS OF APPLICATION

Double sided screw connectors GÓRALMET are designated for making tie-beams of metal and wooden building constructions in residential buildings, buildings of collective habitation, public, industry and store buildings.

In view of corrosive aggression of the environment, the connectors shall be applied with requirements according to PN-EN ISO 9223:2012.

Applying double sided screw connectors GÓRALMET shall be in accordance with technical design developed for the specific building taking valid technical and building regulations into account, and particularly the Infrastructure Minister's Ordinance of 12 April 2002 on the Technical Conditions, which buildings and their location should apply (Journal of Laws "Dziennik Ustaw" 2002 No. 75 item 690, with later amendments) and manufacturer's information on conditions of making tie-beams with application of double sided screw connectors GÓRALMET.



Characteristic stretching capacities of double sided screw connectors GÓRALMET are given in tables 1 ÷ 11. Computational capacities shall be established while designing connections taking safety factor with value not less than 1.75 into account.

3. TECHNICAL PROPERTIES. REQUIREMENTS

3.1. Materials

Double sided screw connectors GÓRALMET shall be made of unalloyed constructional steel quality S235JRG2C according to PN-EN 10277-2:2009 or other steel of mechanical properties not lower than properties of steel quality S235JRG2C.

3.2. Products

3.2.1. Shape and dimensions. The shape and dimensions of double sided connectors GÓRALMET shall be in accordance with the figures nr 1 ÷ 11. Acceptable deviations of the realization shall correspond with class B according to PN-EN ISO 4759-1:2004. Metric threads shall be made in medium quality according to PN-ISO 965-1:2001 and PN-ISO 965-2:2001+Ap1:2003. Acceptable dimension deviations of wrought items shall be in accordance with class F according to PN-EN 10243-1:2002+AC:2005. Deviations of untolerated dimensions shall be in accordance with medium quality according to PN-EN 22768-1:1999.

3.2.2. Surface condition. Surface of the connectors shall be smooth, without cracks, burrs or corrosion traces. On the surface one can find roughness traces, left by treatment tools or by technological chucks.

3.2.3. Protective coating thickness. Elements of double sided connectors GÓRALMET shall be protected against corrosion with an electrolytical zinc coating, which fulfills requirements of PN-EN ISO 4042:2001+Ap1:2004, with thickness not less than 12 μm .



3.2.4. Characteristic capacities of connectors while stretching. Characteristic capacity of connectors while stretching shall not be less than values given in tables 1 ÷ 11.

4. PACKAGING, STORAGE, TRANSPORT

Connectors GÓRALMET shall be delivered in the manufacturer's packaging, stored and transported in a manner ensuring that their properties will remain unchanged. The information to be attached to the packaging shall include at least the following data:

- name and address of the manufacturer,
- name of the product,
- number of the ITB Technical Approval ITB AT-15-8948/2012,
- building mark,
- name of the certification body engaged in the attestation,
- number and date of issue of the national declaration of conformity.

The form of the building marking shall comply with the Ordinance by the Minister of Infrastructure of 11 August 2004 on Declaration of Conformity of Construction Products and their Marking with the Building (B) Mark (Journal of Laws "Dziennik Ustaw" No. 198/2004, item 2041).

5. CONFORMITY ASSESSMENT

5.1. General Conditions.

Pursuant to article 4, article 5 item 1 subitem 3 and article 8 item 1 of the act of 16 April 2004 on Construction Products (Journal of Laws "Dziennik Ustaw" No. 92/2004, item 881 with later amendments) the products referred to in this Technical Approval may be marketed and applied in execution of construction works within the scope corresponding with their performances and intended use, provided that the manufacturer has made the attestation of conformity, issued a national declaration of conformity with the ITB Technical Approval AT-15-8948/2012, and marked the products with the building mark, in accordance with the applicable regulations.

By virtue of the Ordinance by the Minister of Infrastructure of 11 August 2004 on Declaration of Conformity of Construction Products and their Marking with the Building (B) Mark (Journal of Laws "Dziennik Ustaw" No. 198/2004, item 2041), the attestation of conformity



for the double sided screw connectors GÓRALMET covered by the ITB Technical Approval AT-15-8948/2012 shall be made by the manufacturer applying the system 2+.

In case of the attestation of conformity according to the system 2+, the manufacturer shall issue the national declaration of conformity with the ITB Technical Approval AT-15-8948/2012 based on:

- a) tasks for the manufacturer:
 - initial type-testing,
 - factory production control,
 - control testing of final products (samples) taken at the factory by the manufacturer in accordance with a prescribed test plan covering testing according to section 5.4.3,
- b) tasks for the approved body:
 - certification of factory production control based on: initial inspection of factory and factory production control and continuous surveillance, assessment and approval of factory production control.

5.2. Initial type-testing

The initial type-testing includes the tests to confirm required technical and performance properties and is to be made before the product is introduced on the market.

The initial type-testing of connectors GÓRALMET include:

- shape and dimensions,
- surface condition,
- zinc coating thickness,
- characteristic capacity while stretching.

The tests used as a basis for determination of technical and performance properties of the product in the approval procedure constitute the initial type-testing in the attestation of conformity.

5.3. Factory production control

The factory production control includes:

1. specification and control of materials,



2. control and tests during the production process and testing of final products (section 5.4.2) to be conducted by the manufacturer in accordance with a prescribed test plan and in compliance with policies and procedures set forth in the documentation of the factory production control, adapted to the production technology and intended to obtain products of required properties.

The production control shall ascertain the conformity of the product with the ITB Technical Approval AT-15-8948/2012. Results of the production control shall be systematically recorded. The records shall confirm that the products meet the criteria of the attestation of conformity. Each product or batch of the products and productive details connected with them shall be clearly identified in the test records.

5.4. Control testing of final products

5.4.1. Program of testing. The program of testing includes:

- a) current testing,
- b) periodical testing.

5.4.2. Current testing. Current testing include checking:

- a) shape and dimensions,
- b) surface condition,
- c) zinc coating thickness.

5.4.3. Periodical testing. Periodical testing include testing characteristic capacity of connectors while stretching.

5.5. Frequency of testing

Current testing shall be performed in accordance with a prescribed test plan, at least on each batch of the products. The size of product batches shall be specified in the documentation of the factory production control.

Current testing shall be performed at least once in three years.

5.6. Methods of testing

5.6.1. Verification of the shape and dimensions. Dimensions shall be checked using measuring devices ensuring the appropriate accuracy of measurements.

Shape shall be checked by comparison with products in the figures 1 ÷ 11.



5.6.2. Verification of the surface condition. The surface condition shall be checked with an unaided eye.

5.6.3. Verification of the thickness of a protective coating. The thickness of a zinc coating shall be checked according to PN-EN ISO 2178:1998, PN-EN ISO 4042:2001+Ap1:2004 or PN-EN ISO 3497:2004.

5.6.4. Verification of the characteristic capacity of connectors while stretching. Verification of the characteristic capacity of connectors while stretching shall be made on at least six samples. Verified products shall be fixed in jaws of a tester with use of appropriate instrumentation. The measurement of forces shall be performed using a device with the range adjusted to the expected value of ultimate force enabling continuous and slow increase of the force until failure. The measurement error shall not exceed 3% in the whole measurement range.

5.7. Taking Samples for Testing

Test samples shall be taken randomly according to PN-N-03010:1983.

5.8. Assessment of Test Results

The manufactured products shall be deemed in conformity with the requirements of this ITB Technical Approval, if the results from all tests are positive.

6. FORMAL AND LEGAL PROVISIONS

6.1. The ITB Technical Approval AT-15-8948/2012 is the document certifying the fitness of the double sided screw connectors GÓRALMET for use in the construction industry within the scope resulting from the provisions herein contained.

Pursuant to article 4, article 5 item 1 subitem 3 and article 8 item 1 of the Act of 16 April 2004 on Construction Products (Journal of Laws “Dziennik Ustaw” No. 92/2004, item 881 with later amendments), the products referred to in this Technical Approval may be marketed and applied in execution of construction works within the scope corresponding with their performances and intended use, provided that the manufacturer has made the attestation of conformity, issued a domestic declaration of conformity with the ITB Technical Approval AT-15-8948/2012 and marked the products with the building (B) mark in accordance with the applicable regulations.



6.2. This ITB Technical Approval does not infringe any rights laid down by the provisions on protection of industrial property, and in particular the Ordinance by the Marshal of the Sejm (Parliament) of the Republic of Poland of 13 June 2003 on Promulgation of Unified Text of the Act of 30 June 2000 Industrial Property Law (“Journal of Laws “ Dziennik Ustaw” No. 119, item 1117). The users of this Technical Approval shall be obliged to secure such rights.

6.3. When issuing this Technical Approval the Building Research Institute shall assume no responsibility for a possible breach of any exclusive or acquired rights.

6.4. This ITB Technical Approval shall not release the manufacturer of double sided screw connectors from its responsibility for appropriate quality of the products or designers of the items or the contractors of construction works from appropriate application.

6.5. The contents of any published booklets and advertisements or other documents related to marketing double sided screw connectors GÓRALMET and their application in the construction industry shall include information about the ITB Technical Approval AT-15-8948/2012 granted to these products.

7. DATE OF EXPIRY

The ITB Technical Approval AT-15-8948/2012 shall be valid to 7 September 2017.

The validity of the ITB Technical Approval may be extended for subsequent periods, provided that the party applying for the Approval or its legal successor files with the Research Building Institute a relevant application not later than 3 months prior to the expiry date hereof.

THE END

ADDITIONAL INFORMATION

Reference standards

PN-EN 10243-1:2002 +AC:2005	Steel die forgings. Tolerances on dimensions. Part 1: Drop and vertical press forgings
PN-EN 10277-2:2009	Bright steel products. Technical delivery conditions. Part 2: Steels for general engineering purposes
PN-EN 22768-1:1999	General tolerances. Tolerances of linear and angular dimensions without individual tolerance indications
PN-EN ISO 2178:1998	Non-magnetic coatings on magnetic substrates. Measurement of coating thickness. Magnetic method.
PN-EN ISO 3497:2004	Metallic coatings. Measurement of coating thickness. X-ray spectrometric methods
PN-EN ISO 4042:2001+ Ap1:2004	Fasteners. Electroplated coatings
PN-EN ISO 4759-1:2004	Tolerances for fasteners. Part 1: Bolts, screws, studs and nuts. Product grades A, B and C
PN-EN ISO 9223:2012	Corrosion of metals and alloys. Corrosivity of atmospheres. Classification, determination and estimation
PN-EN ISO 965-1:2001	ISO general-purpose metric screw threads. Tolerances. Part 1: Principles and basic data



PN-ISO 965-2:2001+ Ap1:2003	ISO general purpose metric screw threads. Tolerances. Part 2: Limits of sizes for general purpose external and internal screw threads. Medium quality
PN-N-03010:1983	Statistic quality control. Random selection of product samples.

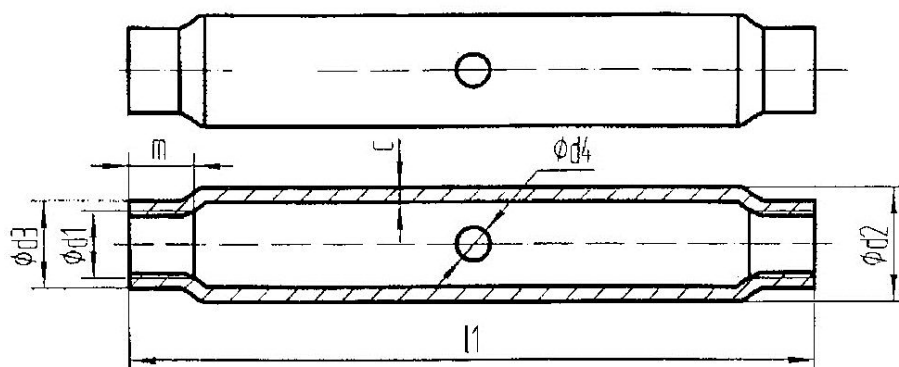
Tests and assessments

1. LOW01-1145/12/Z00OWN. The test report concerning double sided screw connectors GÓRALMET, by Laboratorium Okuć i Ślusarki Budowlanej ITB Oddział Wielkopolski (Building Hardware and Ironmongery Laboratory - Wielkopolska Branch of ITB), 61-819 Poznań, ul. S. Taczaka 12.
2. OWN-OT-021/2012. The technical assessment concerning double sided screw connectors GÓRALMET used for metal and wooden building constructions, Zakład Okuć i Ślusarki Budowlanej-OWN, ITB Oddział Wielkopolski (Building Hardware and Ironmongery Department – Wielkopolska Branch), 61-819 Poznań, ul. S. Taczaka 12.



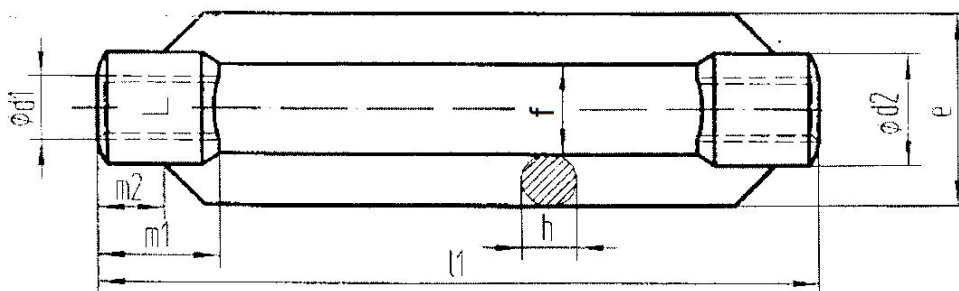
FIGURES AND TABLES

Figure 1	Tube tension nut GM SR-K.....	14
Figure 2	Open tension nut GM SO-K.....	14
Figure 3	Double sided screw connector GM SR-PP with a tube nut and two threaded straight rods.....	15
Figure 4	Double sided screw connector GM SR-SS with a tube nut and two threaded rods ended with a fork joint.....	15
Figure 5	Double sided screw connector GM SR-OO with a tube nut and two threaded rods ended with an eye hook.....	16
Figure 6	Double sided screw connector GM SR-HH with a tube nut and two threaded rods ended with an open hook.....	16
Figure 7	Double sided screw connector GM SR-HO with a tube nut and two threaded rods, one ended with an eye hook, and the other with an open hook.....	17
Figure 8	Double sided screw connector GM SO-PP with an open nut and two threaded rods.....	17
Figure 9	Double sided screw connector GM SO-OO with an open nut and two threaded rods ended with an eye hook.....	18
Figure 10	Double sided screw connector GM SO-HH with an open nut and two threaded rods ended with an open hook.....	18
Figure 11	Double sided screw connector GM SO-HO with an open nut and two threaded rods, one ended with an eye hook, and the other with an open hook.....	19
Table 1	Characteristic capacities of GM SR-K nuts while stretching.....	20
Table 2	Characteristic capacities of GM SO-K nuts while stretching.....	20
Table 3	Characteristic capacities of GM SR-PP connector while stretching....	21
Table 4	Characteristic capacities of GM SR-SS connector while stretching....	21
Table 5	Characteristic capacities of GM SR-OO connector while stretching...22	
Table 6	Characteristic capacities of GM SR-HH connector while stretching...22	
Table 7	Characteristic capacities of GM SR-HO connector while stretching...23	
Table 8	Characteristic capacities of GM SO-PP connector while stretching....23	
Table 9	Characteristic capacities of GM SO-OO connector while stretching...24	
Table 10	Characteristic capacities of GM SO-HH connector while stretching...24	
Table 11	Characteristic capacities of GM SO-HO connector while stretching...25	



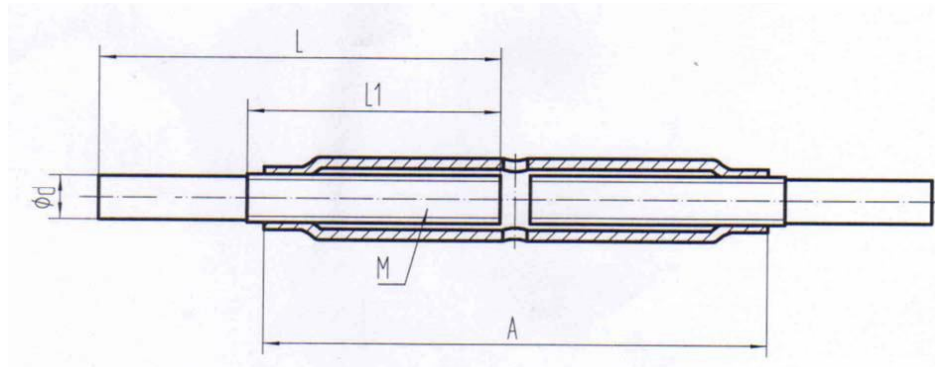
Thread	l1, mm	Ød2, mm	Ød3 _{min} , mm	Ød4, mm	c, mm	m _{min} , mm
M5	70	14.5	10.0	6.5	2.9	6.0
M6	110	14.5	11.00	6.5	2.9	7.5
M8	110	17.2	12.8	8.5	3.6	10.0
M10	125	21.3	15.8	8.5	4.0	12.0
M12	125	25.0	18.0	10.5	4.0	15.0
M16	170	30.0	22.5	11.5	4.5	20.0
M20	200	33.7	27.0	12.5	5.0	24.0
M22	220	36.0	29.0	12.5	5.0	26.5
M24	255	42.4	31.5	12.5	5.6	29.0
M27	255	42.4	32.0	14.5	5.6	32.0
M30	255	51.0	38.0	16.5	6.3	36.0
M36	295	63.5	47.5	16.5	8.0	43.0
M42	330	70.0	54.0	20.5	8.8	51.0

Figure 1 Tube tension nut GM SR-K



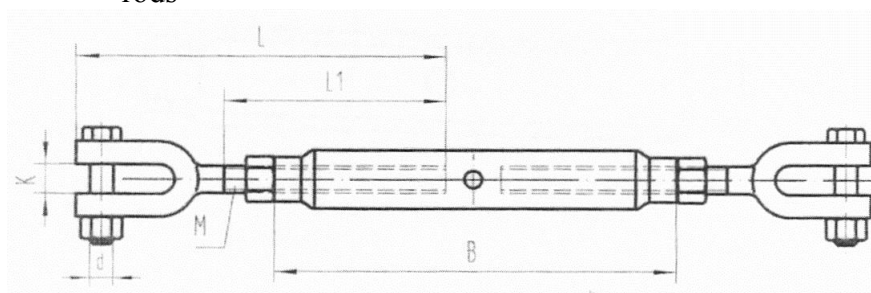
Thread	l1, mm	Ød2, mm	e, mm	f, mm	h _{min} , mm	m1 _{min} , mm	m2 _{max} , mm
M5	70	10	16.5	7	5	10	4
M6	110	12	19	9	5.5	12	6
M8	110	15	23	11	7.4	15	8
M10	125	18	29	13	8.4	18	9
M12	125	21	34	16	10.4	21	11
M14	140	24	37	17	11.4	25	13
M16	170	27	42	20	13.4	27	14
M18	196	31	46	22	15.5	32	16
M20	200	34	52	24	16.2	34	17
M22	220	36	56	26	17.2	34.5	18.5
M24	255	39	60	28	19.2	39	20
M27	255	45	74	34	22.2	42.5	22.5
M30	255	45	74	34	22.2	42.5	22.5
M36	295	55	86	40	27.2	53.5	27.5
M42	330	63	104	50	31.2	63	33

Figure 2 Open tension nut GM SO-K



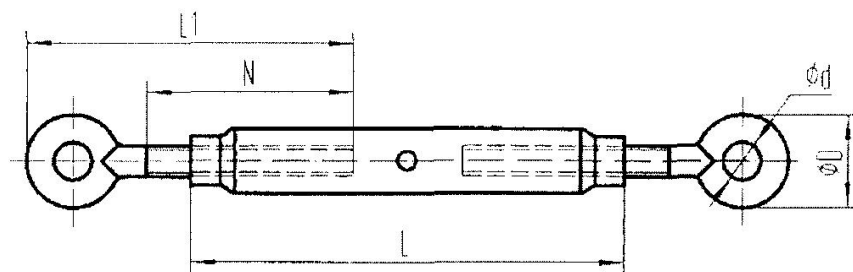
Thread	L, mm	L1, mm	A, mm	Ød, mm
M5	85	40	70	4.35
M6	120	65	110	5.25
M8	120	65	110	7.1
M10	150	75	125	8.9
M12	150	75	125	10.7
M16	196	100	170	14.5
M20	216	120	200	18.1
M22	216	130	220	20.1
M24	256	150	255	21.7
M27	256	150	255	21.7
M30	256	150	255	27.35
M36	300	180	295	33.1
M42	350	200	330	38.8

Figure 3 Double sided screw connector GM SR-PP with a tube nut and two threaded straight rods



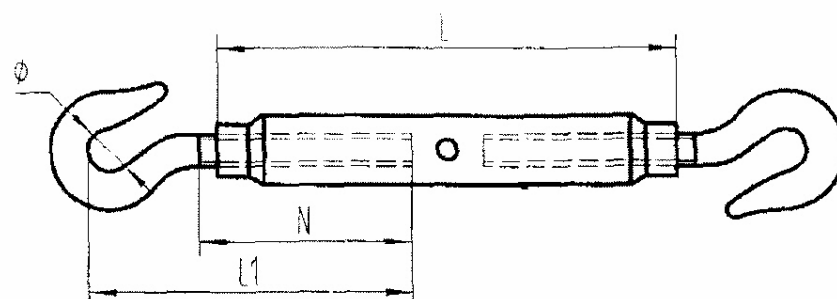
Thread	B, mm	L, mm	L1, mm	K, mm	Thread d
M6	110	101	63	7	M5
M8	110	110	63	9	M6
M10	125	125	72	10.5	M8
M12	125	138	75	13	M10
M16	170	175	100	18	M12
M20	200	213	120	20	M16
M22	220	240	137	25	M20
M24	255	275	157	30	M22

Figure 4 Double sided screw connector GM SR-SS with a tube nut and two threaded rods ended with a fork joint



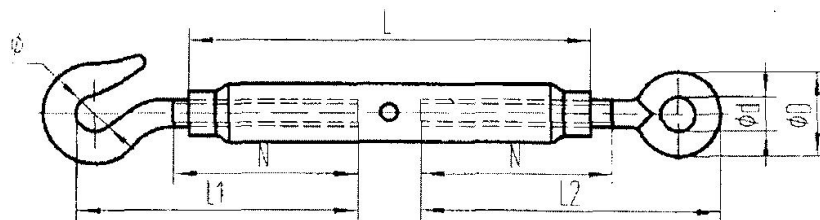
Thread	L, mm	L1, mm	N, mm	ØD, mm	Ød, mm
M5	70	57	35	16	8
M6	110	80	55	20	9
M8	110	85	57	22	10
M10	125	105	68	31	14
M12	125	111	70	35	16
M16	170	150	88	47	22
M20	200	168	105	52	24
M22	220	190	118	60	28
M24	255	212	135	65	28
M27	255	224	135	71	31
M30	255	224	135	71	31
M36	295	277	158	94	38

Figure 5 Double sided screw connector GM SR-OO with two threaded rods ended with an eye hook



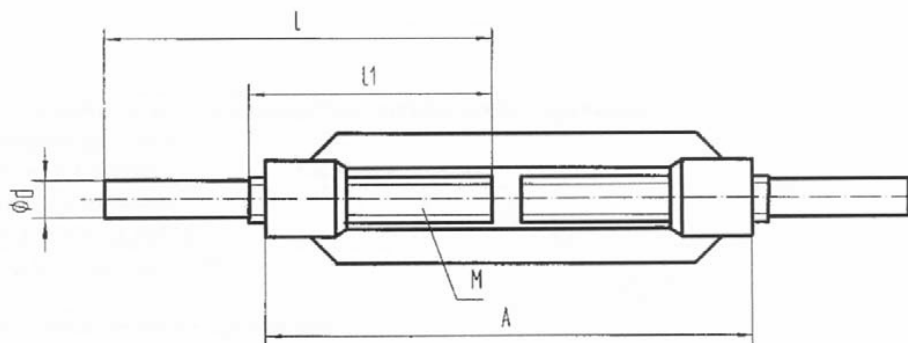
Thread	L, mm	L1, mm	N, mm	Ø, mm
M5	70	56	35	7
M6	110	77	55	8
M8	110	85	57	10.5
M10	125	106	68	13
M12	125	117	70	16
M16	170	144	88	20
M20	200	170	105	21
M22	220	200	118	24
M24	255	215	135	26
M27	255	240	135	34
M30	255	240	135	34
M36	295	275	160	46

Figure 6 Double sided screw connector GM SR-HH with a tube nut and two threaded rods ended with an open hook



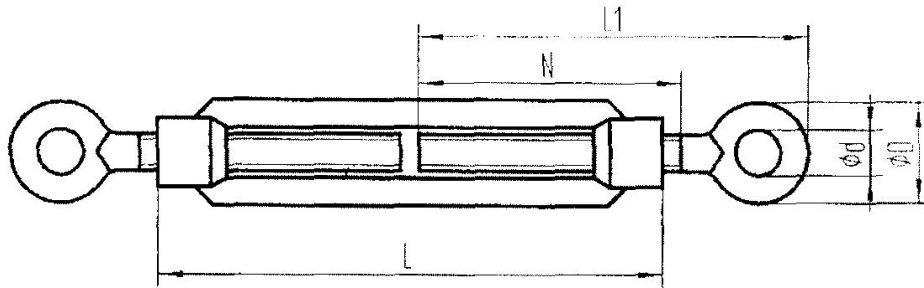
Thread	L, mm	L1, mm	N, mm	L2, mm	ØD, mm	Ød, mm	Ø, mm
M5	70	56	35	57	16	8	7
M6	110	77	55	80	29	9	8
M8	110	85	57	85	22	10	10.5
M10	125	106	68	105	31	14	13
M12	125	117	70	111	35	16	16
M16	170	144	88	150	47	22	20
M20	200	170	105	168	52	24	21
M22	220	200	118	190	60	28	24
M24	255	215	135	212	65	28	26
M27	255	240	135	224	71	31	34
M30	255	240	135	224	71	31	34
M36	295	275	160	277	94	38	46

Figure 7 Double sided screw connector GM SR-HO with a tube nut and two threaded rods, one ended with an eye hook, and the other with an open hook



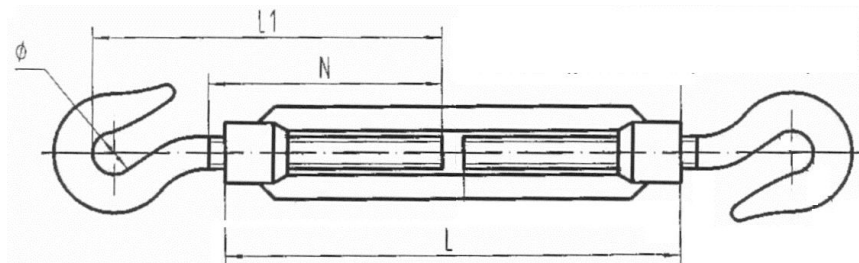
Thread	L, mm	L1, mm	A, mm	Ød, mm
M5	85	40	70	4.35
M6	120	65	110	5.25
M8	120	65	110	7.1
M10	150	75	125	8.9
M12	150	75	125	10.7
M14	162	85	140	12.55
M16	196	100	170	14.5
M20	216	120	200	18.1
M22	216	130	220	20.1
M24	256	150	255	21.7
M27	256	150	255	24.6
M30	256	160	255	27.35
M36	300	180	295	33.1
M42	350	200	330	38.8

Figure 8 Double sided screw connector GM SO-PP with an open nut and two threaded rods



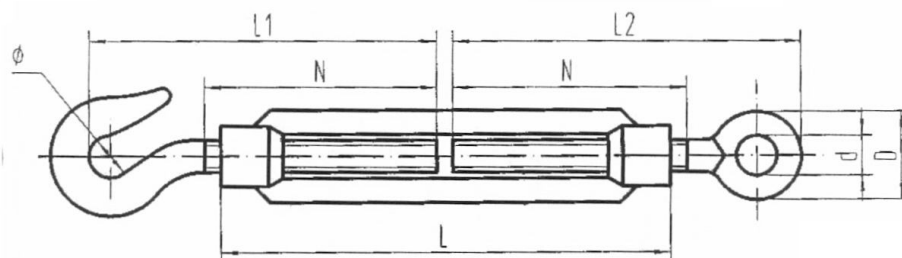
Thread	L, mm	N, mm	L1, mm	Ød, mm	ØD, mm
M5	70	35	57	8	16
M6	110	55	80	9	20
M8	110	57	85	10	22
M10	125	68	105	14	31
M12	125	70	111	16	35
M14	140	75	124	18	40
M16	170	88	150	22	47
M18	196	98	161	25	51
M20	200	105	168	24	52
M22	220	118	190	28	60
M24	255	135	212	28	60
M27	255	135	224	31	71
M30	255	135	224	31	71
M36	295	158	277	38	94

Figure 9 Double sided screw connector GM SO-OO with an open nut and two threaded rods ended with an eye hook



Thread	L, mm	N, mm	L1, mm	Ø, mm
M5	70	35	56	7
M6	110	55	77	8
M8	110	57	85	10.5
M10	125	68	106	13
M12	125	70	117	16
M14	140	75	124	18
M16	170	88	144	20
M18	196	98	163	21
M20	200	105	170	21
M22	220	118	200	24
M24	255	135	215	26
M27	255	135	240	34
M30	255	135	240	34
M36	295	160	275	46

Figure 10 Double sided screw connector GM SO-HH with an open nut and two threaded rods ended with an open hook



Thread	L, mm	D, mm	d, mm	L2,mm	Ø, mm	N, mm	L1, mm
M5	70	16	8	57	7	35	56
M6	110	20	9	80	8	55	77
M8	110	22	10	85	10.5	57	85
M10	125	31	14	105	13	68	106
M12	125	35	16	111	16	70	117
M14	140	40	18	124	18	75	124
M16	170	47	22	150	20	88	144
M18	196	51	25	161	21	98	163
M20	200	52	24	168	21	105	170
M22	220	60	28	190	24	118	200
M24	255	60	28	212	26	135	215
M27	255	71	31	224	34	135	240
M30	255	71	31	224	34	135	240
M36	295	94	38	277	46	160	275

Figure 11 Double sided screw connector GM SO-HO with an open nut and two threaded rods, one ended with an eye hook, and the other with an open hook

Characteristic capacities of GM SR-K nuts while stretching

Table 1

Nr	Marking	Characteristic capacity, kN
1	GM SR-K M5	11.54
2	GM SR-K M6	17.05
3	GM SR-K M8	32.68
4	GM SR-K M10	46.93
5	GM SR-K M12	76.21
6	GM SR-K M16	134.42
7	GM SR-K M20	166.59
8	GM SR-K M22	234.61
9	GM SR-K M24	221.80
10	GM SR-K27	249.78
11	GM SR-K M30	347.44
12	GM SR-K M36	578.45
13	GM SR-K M42	751.66

Characteristic capacities of GM SO-K nuts while stretching

Table 2

Nr	Marking	Characteristic capacity, kN
1	GM SO-K M5	11.64
2	GM SO-K M6	17.08
3	GM SO-K M8	32.98
4	GM SO-K M10	50.47
5	GM SO-K M12	68.45
6	GM SO-K M14	76.42
7	GM SO-K M16	87.72
8	GM SO-K M18	118.01
9	GM SO-K M20	166.31
10	GM SO-K M22	163.58
11	GM SO-K M24	211.18
12	GM SO-K M27	307.10
13	GM SO-K M30	302.68
14	GM SO-K M36	426.53
15	GM SO-K M42	525.44

Characteristic capacities of GM SR-PP connector while stretching

Table 3

Nr	Marking	Characteristic capacity, kN
1	GM SR-PP M5	8.75
2	GM SR-PP M6	12.17
3	GM SR-PP M8	20.46
4	GM SR-PP M10	26.68
5	GM SR-PP M12	43.60
6	GM SR-PP M16	94.76
7	GM SR-PP M20	142.00
8	GM SR-PP M22	172.64
9	GM SR-PP M24	198.14
10	GM SR-PP M27	278.14
11	GM SR-PP M30	269.14
12	GM SR-PP M36	426.50
13	GM SR-PP M42	518.55

Characteristic capacities of GM SR-SS connector while stretching

Table 4

Nr	Marking	Characteristic capacity, kN
1	GM SR-SS M6	12.13
2	GM SR-SS M8	18.94
3	GM SR-SS M10	31.94
4	GM SR-SS M12	44.03
5	GM SR-SS M16	77.62
6	GM SR-SS M20	118.25
7	GM SR-SS M22	132.67
8	GM SR-SS M24	163.81

Characteristic capacities of GM SR-OO connector while stretching

Table 5

Nr	Marking	Characteristic capacity, kN
1	GM SR-OO M5	4.84
2	GM SR-OO M6	7.80
3	GM SR-OO M8	14.74
4	GM SR-OO M10	24.80
5	GM SR-OO M12	30.90
6	GM SR-OO M16	58.53
7	GM SR-OO M20	72.13
8	GM SR-OO M22	94.78
9	GM SR-OO M24	162.20
10	GM SR-OO M27	164.34
11	GM SR-OO M30	185.83
12	GM SR-OO M36	237.66

Characteristic capacities of GM SR-HH connector while stretching

Table 6

Nr	Marking	Characteristic capacity, kN
1	GM SR-HH M5	2.18
2	GM SR-HH M6	2.91
3	GM SR-HH M8	6.05
4	GM SR-HH M10	7.95
5	GM SR-HH M12	8.50
6	GM SR-HH M16	13.56
7	GM SR-HH M20	21.39
8	GM SR-HH M22	41.28
9	GM SR-HH M24	42.44
10	GM SR-HH M27	74.40
11	GM SR-HH M30	68.67
12	GM SR-HH M36	115.28

Characteristic capacities of GM SR-HO connector while stretching

Table 7

Nr	Marking	Characteristic capacity, kN
1	GM SR-HO M5	2.18
2	GM SR-HO M6	2.91
3	GM SR-HO M8	6.05
4	GM SR-HO M10	7.95
5	GM SR-HO M12	8.50
6	GM SR-HO M16	13.56
7	GM SR-HO M20	21.39
8	GM SR-HO M22	41.28
9	GM SR-HO M24	41.44
10	GM SR-HO M27	74.40
11	GM SR-HO M30	68.67
12	GM SR-HO M36	115.28

Characteristic capacities of GM SO-PP connector while stretching

Table 8

Nr	Marking	Characteristic capacity, kN
1	GM SO-PP M5	8.75
2	GM SO-PP M6	12.17
3	GM SO-PP M8	20.46
4	GM SO-PP M10	26.68
5	GM SO-PP M12	43.60
6	GM SO-PP M14	53.61
7	GM SO-PP M16	94.76
8	GM SO-PP M20	142.00
9	GM SO-PP M22	172.64
10	GM SO-PP M24	198.14
11	GM SO-PP M27	278.14
12	GM SO-PP M30	269.14
13	GM SO-PP M36	426.50
14	GM SO-PP M42	518.55

Characteristic capacities of GM SO-OO connector while stretching

Table 9

Nr	Marking	Characteristic capacity, kN
1	GM SO-OO M5	4.84
2	GM SO-OO M6	7.80
3	GM SO-OO M8	14.74
4	GM SO-OO M10	24.80
5	GM SO-OO M12	30.90
6	GM SO-OO M14	45.00
7	GM SO-OO M16	58.53
8	GM SO-OO M18	72.07
9	GM SO-OO M20	72.13
10	GM SO-OO M22	94.78
11	GM SO-OO M24	162.20
12	GM SO-OO M27	164.34
13	GM SO-OO M30	185.83
14	GM SO-OO M36	237.66

Characteristic capacities of GM SO-HH connector while stretching

Table 10

Nr	Marking	Characteristic capacity, kN
1	GM SO-HH M5	2.18
2	GM SO-HH M6	2.91
3	GM SO-HH M8	6.05
4	GM SO-HH M10	7.95
5	GM SO-HH M12	8.50
6	GM SO-HH M14	10.02
7	GM SO-HH M16	13.56
8	GM SO-HH M18	16.13
9	GM SO-HH M20	21.39
10	GM SO-HH M22	41.28
11	GM SO-HH M24	41.44
12	GM SO-HH M27	74.40
13	GM SO-HH M30	68.67
14	GM SO-HH M36	115.28

Characteristic capacities of GM SO-HO while stretching

Table 11

Nr	Marketing	Characteristic capacity, kN
1	GM SO-HO M5	2.18
2	GM SO-HO M6	2.91
3	GM SO-HO M8	6.05
4	GM SO-HO M10	7.95
5	GM SO-HO M12	8.50
6	GM SO-HO M14	10.02
7	GM SO-HO M16	13.56
8	GM SO-HO M18	16.13
9	GM SO-HO M20	21.39
10	GM SO-HO M22	41.28
11	GM SO-HO M24	41.44
12	GM SO-HO M27	74.40
13	GM SO-HO M30	68.67
14	GM SO-HO M36	115.28



Instytut Techniki Budowlanej

ISBN 978-83-249-5998-3