

## GEOTECHNICAL SYSTEMS

**DYWI® Drill Hollow Bars with Couplers and Anchorages as a Load-bearing Element in Geotechnics - Types R32-210, R32-250, R32-280, R32-320, R32-360, R32-400, R38-420, R38-500, R38-550, R51-550, R51-660, R51-800, T76-1300, T76-1650 und T76-1900**

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**General Construction  
Supervisory Authority  
Approval/ General  
Design-Type Approval**

Deutsches  
Institut  
für  
Bautechnik

**DIBt**

A statutory body jointly sponsored by the German national government and the German federal states

**Approval Body for Building Products and Building Methods**

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**Applicant:**  
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**Subject of Approval:**  
**DYWI® Drill Hollow Bars with Connections and Anchorages as a Load-Carrying Element in Geotechnical Engineering - Types R32-210, R32-250, R32-280, R32-320, R32-360, R32-400, R38-420, R38-500, R38-550, R51-550, R51-660, R51-800, T76-1300, T76-1650 and T76-1900**

The above mentioned subject is hereby granted general construction supervisory authority accreditation/approval.

This Approval comprises nine pages and eight Annexes.

The subject was first approved on 10 June 2013 by the construction authorities.

**Important note**

This general construction supervisory authority approval/general design-type approval is the translation of a document originally prepared in the German language which has not been verified and officially authorized by "Deutsches Institut für Bautechnik" (German Institute for Civil Engineering). In case of doubt in respect to the wording and interpretation of this notice, the original German version hereof shall prevail exclusively. Therefore, no liability is assumed for translation errors or inaccuracies

**DIBt**

## II GENERAL PROVISIONS

- 1 This Approval confirms the usability and/or applicability of the subject of the regulation under the Laender construction regulations.
- 2 This Approval does not replace any permits, approvals or certificates required by law for the implementation of construction projects.
- 3 This Approval is issued without prejudice to any third party rights, including, but not limited to private property rights.
- 4 Copies of this Approval shall be made available to the user of the subject of the regulation irrespective of further regulations provided under the "Special Provisions" section. In addition, the user of the subject of the regulation shall be informed that this Approval must be available at the point of use or application. Copies must also be made available to any relevant authorities upon request.
- 5 This Approval may only be reproduced in its entirety. Publication of excerpts requires the approval of the German Institute for Building Technology. Texts and drawings included in any advertising leaflets may not contradict this Approval; translations must contain the note "Translation of the German original version not verified by the German Institute for Building Technology".
- 6 This Approval is granted subject to revocation. These provisions may be supplemented or changed later, including, but not limited to if new technical knowledge requires this.
- 7 This Approval refers to the information made available and documents provided by the applicant on the subject of approval. Any change to these materials is not covered by this Approval and must be immediately reported to the German Institute for Building Technology.

### III SPECIAL PROVISIONS

#### 1 Subject of the approval and scope of use or application

The subject of this approval are “DYWI® Drill” hollow bars with the associated connecting and anchoring components.

The hollow bars are longitudinally welded and seamless steel tubes made of quenched and tempered steel with a rolled-on thread.

Couplers made of steel with inner threads to which the hollow bars are screwed make up the connecting components for the formation of tension and compression joints.

Anchoring components for load application at the top of the hollow bars are steel or domed nuts and spherical or flat plates.

The subject of approval is the design, dimensioning and execution of DYWI® Drill Hollow Bars with connecting and anchoring components as steel load-bearing elements for soil nailing and injection piles (micro piles).

The hollow bars are connected by means of a screwed connection to the couplers either during the drilling process or by applying a pre-defined tightening torque, which in each case creates a slip-reducing preload on the threads and screws the hollow bars together to form a load-carrying element with form-locking and force-locking screwed connection.

Technical building specifications shall apply, taking into account the information in this approval.

#### 2 Provisions for the construction product

##### 2.1 Properties and composition

##### 2.1.1 Hollow bars

The hollow bars have a maximum length of 6.0 m and are continuously provided with a rolled-on round or trapezoidal thread. The standard lengths of the hollow bars are 1, 2, 3, 4 or 6m.

The hollow bars of the R32, R38 and R51 series are longitudinally welded tubes made of quenched and tempered steel with a continuously rolled-on thread of the following types:

R32-210, R32-250, R32-280, R32-320, R32-360, R32-400,

R38-420, R38-500, R38-550,

R51-550, R51-660, R51-800.

T76 series hollow bars are seamless tubes made of quenched and tempered steel with a continuous rolled-on trapezoidal thread of the following types:

T76-1300, T76-1650 and T76-1900.

In this context, R means rolled round thread, T means rolled trapezoidal thread, the numbers 32, 38, 51 and 76 mean the nominal diameter of the hollow bar in [mm], and the numbers 210 to 1900 mean the nominal value of the tensile strength in [kN].

The geometry, the nominal weight, as well as the mechanical properties and the chemical composition of the hollow bars must comply with the details provided in Annexes 1 to 4 and with the documents deposited at DIBt. The material properties must be verified by means of a certificate of conformity 3.1 according to DIN EN 10204<sup>1</sup>.

<sup>1</sup> DIN EN 10204:2005-01 Metallic products – Types of inspection documents

### 2.1.2 Couplers, nuts, spacers and bearing plates

The initial material as well as the main dimensions of the couplers, nuts, spacers and bearing plates must comply with the details in Annexes 5 to 8 and with the documents deposited at DIBt. The material properties of the couplers and nuts shall be verified by means of a certificate of conformity "3.1" according to DIN EN 10204<sup>1</sup>, while the material properties of the spacers and bearing plates shall be verified by means of a test report "2.2" according to DIN EN 10204<sup>1</sup>.

## 2.2 Production, packaging, transport, storage and marking

### 2.2.1 Production

#### 2.2.1.1 Hollow bars

The hollow bars of the R32, R38 and R51 series consist of strip formed and HF longitudinally welded steel tubes with the inner burr removed, made of quenched and tempered 28Mn6 steel according to DIN EN ISO 683-1<sup>2</sup>.

The hollow bars of the T76 series consist of seamless tubes made of quenched and tempered 28Mn6 steel according to DIN EN ISO 683-1<sup>2</sup>.

Information on the manufacture of hollow bars and threads is deposited at the DIBt.

#### 2.2.1.2 Couplers, nuts, spacers and bearing plates

Depending on the material used (see Annexes 5, 6 and 7), the couplers, nuts and spacers are either cast into their final form or cut as blanks from the steel bar into sections, drilled and provided with a cut inner thread analogue to the hollow bar in the manufacturing plant.

The bearing plates are cut from the metal sheet precursor material, drilled and punched or annealed.

Additional information on the manufacture of the couplers, nuts and bearing plates is deposited at DIBt.

### 2.2.2 Packaging, transport and storage

The individual components (hollow bars, couplers, nuts and bearing plates) shall be packed, transported and stored so that they are protected against corrosion, mechanical damage and dirt accumulation prior to their installation at the construction site.

### 2.2.3 Marking

The packaging and delivery note for the construction product "DYWI® Drill" must be marked with the conformity mark by the manufacturer pursuant to the conformity symbol regulations issued by the German Länder. Such marking is allowed only if the requirements as per Section 2.3 are met. If the manufacturer indication is encoded, a list including the complete data and the codes assigned shall be deposited with the German Institute for Building Technology and the notified product certification body.

Couplers and nuts must be additionally marked at the positions indicated in Annexes 5 and 6, to allow for identification of the manufacturer.

## 2.3 Conformity confirmation

### 2.3.1 General

Confirmation of conformity of the "DYWI® Drill" construction product with the provisions of the general construction supervisory authority approval must be provided for each manufacturing plant along with a declaration of conformity from the manufacturer based on a plant production control and a certificate of conformity from a recognized certification body and regular external monitoring performed by a recognized monitoring body in accordance with the following provisions:

<sup>2</sup> DIN EN ISO 683-1:2018-09 Heat-treatable steels, alloy steels and free-cutting steels – Part 1: Non-alloy steels for quenching and tempering (ISO 683-1:2016)

The issuance of the certificate of conformity and the external monitoring, including the product tests to be carried out, require from the applicant for the "DYWI® Drill" construction products to engage a recognized certification body and a recognized monitoring body.

The manufacturer submits the declaration of conformity by marking the construction products with a conformity mark with reference to the intended use.

The certification body must provide the German Institute for Building Technology with a copy of the certificate of conformity they have issued.

Additionally, a copy of the initial test report must be submitted to the German Institute for Building Technology.

### 2.3.2 Plant production control

A plant production control must be set up and carried out at every manufacturing plant. Plant production control is understood as the continuous monitoring of production by the manufacturer, by means of which they ensure that the construction products manufactured meet the requirements of this general construction supervisory authority approval.

The plant production control system should at least include the following measures:

The documents deposited at DIBt must be observed.

It must be checked whether the inspection documents for the materials as defined by Section 2.1 are available and whether the certified inspection results meet the requirements.

#### Hollow bars:

After the thread has been rolled on, the manufacturer must carry out the following tests per diameter and rolling batch:

At least one randomly selected sample is to be taken and tested in a tensile test. The examination of the tensile specimen must include: the weight relative to the length, the thread geometry according to ISO 10208<sup>3</sup>, the 0.2% yield strength, the tensile strength and the breaking elongation ( $A_{gt}$ ).

In addition, the thread dimensions must be continuously checked during the thread rolling process, e.g. with thread gauges.

#### Couplers, nuts, bearing plates and spacers:

Couplers and nuts are delivered in batches. The plant production control must be carried out in the particular manufacturing plant.

At least the following inspections must be carried out:

- All components must be visually inspected with regard to externally visible faults (no records required thereof).
- The main dimensions according to Annexes 5 to 8 must be verified on 0.5% of the individual components. The dimensions including the thread dimensions must be checked on couplers and nuts. If the dimensions of a component are outside the permissible range of tolerance, then all components of the particular mold must be verified with regard to their dimensions.
- The static load-bearing capacity of 0.1% of the anchoring components and couplers shall be verified by means of a tensile test.

Results of the plant production control must be recorded and evaluated. Such records must contain at least the following information:

- Designation of the construction product or the initial material and its components;
- Nature of the control or inspection

<sup>3</sup> ISO 10208:1991-02 Rock drilling equipment; left-hand threads, rope thread

- Date of manufacturing and inspection of the construction product or the initial material or its components;
- Results of the controls and inspections and, if applicable, a comparison with the relevant requirements,
- Signature of the person responsible for the plant production control.

Such records must be retained for at least five years and presented to the monitoring body responsible for external monitoring. They must be presented to the German Institute for Building Technology and to the competent highest construction supervisory authority on request.

If the inspection result is unsatisfactory, the manufacturer must immediately take the necessary measures to remove the defect. Construction products that do not meet the requirements must be handled in such a way so as to exclude confusion with the conforming ones. When the defect is removed, the respective inspection must be repeated immediately – insofar as it is technically possible and necessary to prove that the defect has been removed.

### 2.3.3 External monitoring

The plant production control in each manufacturing plant must be monitored by external monitoring on a regular basis, but at least once a year.

An initial inspection of the construction product must be carried out as part of external monitoring. Samples are to be taken for spot checks and the testing tools are to be controlled. Sampling and testing are incumbent on the respective recognized monitoring body.

The results of the certification and external monitoring must be retained for at least five years. They must be presented by the certification body or the monitoring body to the German Institute for Building Technology and to the competent highest construction supervisory authority on request.

## 3 Provisions for planning, design and installation

### 3.1 Planning

As part of planning, the provisions of this approval are to be observed, taking into account general construction supervisory authority approval/general design-type approval for soil nailing or injection piles (micro piles).

### 3.2 Design

#### 3.2.1 General

The following provisions apply to the design, taking into account the specifications of general construction supervisory authority approval/general design-type approval for soil nailing or injection piles (micro piles).

#### 3.2.2 Predominantly dead load

Splices and anchoring as per this general construction supervisory authority approval/general design-type approval may be subjected to 100 % of the load of an unspliced bar in case of predominantly static tension and compression loads.

#### 3.2.3 Fatigue load

For hollow bars without connecting or anchoring components, fatigue testing for loads that are not predominantly static shall be performed as per DIN-EN 1992-1-1<sup>44</sup> Section 6.8, the characteristic value for the fatigue strength shall be  $\Delta\sigma_{Rsk} = 210 \text{ N/mm}^2$  for  $N = 10^6$  load cycles. The stress exponents of the stress-number curve shall be arranged with  $k_1 = 4$  und  $k_2 = 9$  for  $N^* = 10^7$ .

<sup>44</sup>DIN EN 1992-1-1:2011-01 Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings, amendment in conjunction with DIN EN 1992-1-1/A1:2015-03; DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992-1-1/NA/A1:2015-12

For hollow bars with connecting and/or anchoring components, a stress range of  $\Delta\sigma_{Rsk} = 60 \text{ N/mm}^2$  shall be applied in the load range of  $0 < N \leq 2 \cdot 10^6$ .

### 3.3 Provisions for work execution

Coupler connections and anchorages may only be assembled by trained personnel. For this purpose, the manufacturer shall make available written work instructions that must be part of the delivery documents.

Only individual parts marked according to Section 2.2.3 may be used.

The threads of the hollow bars and the connecting and anchoring components must be clean and rust-free.

The distance between the joints must be  $\geq 1 \text{ m}$ . To achieve sufficient self-locking between the steel tendon and the coupler, the ends of the steel tendon must be tensioned against one another when coupled at a torque of at least 500 Nm. For this purpose, a calibrated torque wrench is to be used. The torque may also be applied by the slewing gear of the drilling rig.

The civil works contractor must submit a declaration of conformity as per Article 16a section 5 in conjunction with Article 21 section 2 of the MBO<sup>5</sup> to confirm that the design of the “DYWI® Drill” Hollow Bars with the associated connecting and anchoring components conforms to the general design-type approval covered by this Approval.

Dr.-Ing. Ronald Schwuchow  
Office Supervisor

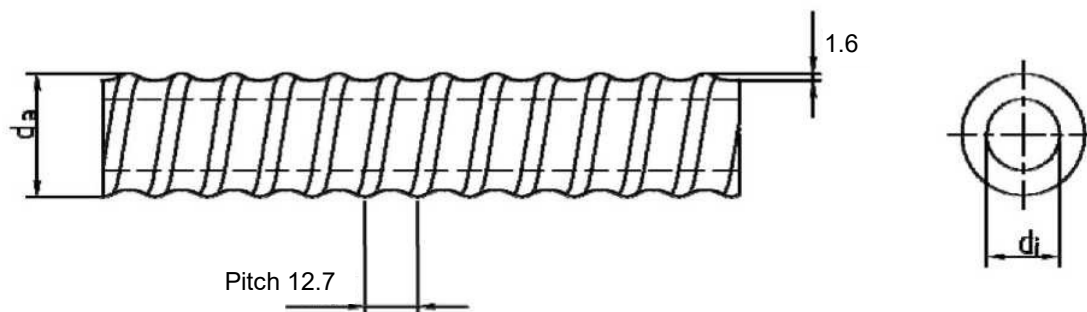
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<sup>5</sup> or its implementation into the Laender construction regulations

## DYWI® Drill Series R32

### Geometry



| Hollow bar type              |           |                    | R32-210 | R32-250 | R32-280 | R32-320 | R32-360 | R32-400 |
|------------------------------|-----------|--------------------|---------|---------|---------|---------|---------|---------|
| Nominal diameter             | $d_{nom}$ | [mm]               | 32      |         |         |         |         |         |
| Actual diameter              | $d_a$     | [mm]               | 31.1    |         |         |         |         |         |
| Inner diameter <sup>1)</sup> | $d_i$     | [mm]               | 21      | 20      | 19      | 17      | 15      | 13      |
| Nominal cross-sectional area | $A_s$     | [mm <sup>2</sup> ] | 340     | 370     | 410     | 470     | 510     | 560     |
| Nominal weight <sup>2)</sup> | $m$       | [kg/m]             | 2.7     | 2.9     | 3.2     | 3.7     | 4.0     | 4.4     |

<sup>1)</sup> Value: only informative; tolerance:  $\pm 2.0$  mm

<sup>2)</sup> Admissible tolerance: -3% to +9%

The bars have a continuous left-hand thread in accordance with the ISO 10208 thread template and material deposited with DIBt

### Mechanical properties

| Hollow bar type                           |             |      | R32-210    | R32-250 | R32-280 | R32-320 | R32-360 | R32-400 |
|-------------------------------------------|-------------|------|------------|---------|---------|---------|---------|---------|
| Load at 0.2% yield strength <sup>3)</sup> | $F_{0.2,k}$ | [kN] | 160        | 190     | 220     | 250     | 280     | 330     |
| Breaking load <sup>3)</sup>               | $F_{t,k}$   | [kN] | 210        | 250     | 280     | 320     | 360     | 400     |
| Elongation at maximum load <sup>3)</sup>  | $A_{gt}$    | [%]  | $\geq 4.0$ |         |         |         |         |         |

<sup>3)</sup> Value corresponds to the 5% quantile

The design value for the elasticity modulus is 200,000 N/mm<sup>2</sup>.

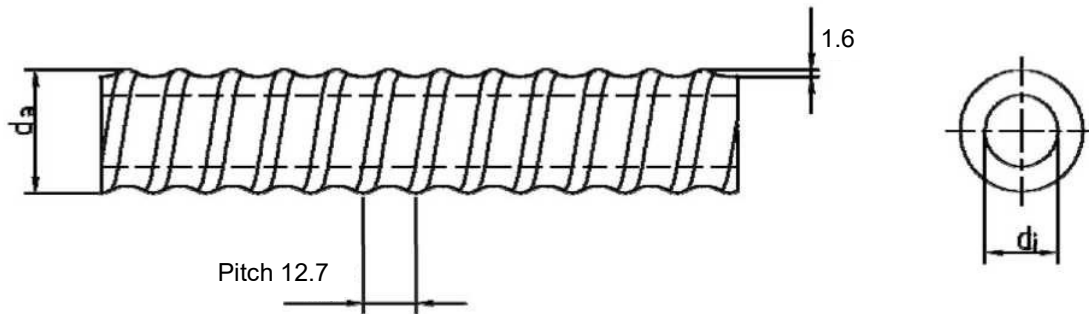
DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

Geometry and mechanical properties of DYWI® Drill Series R32

Annex 1

## DYWI® Drill Series R38

### Geometry



| Hollow bar type              |           |                    | R38-420 | R38-500 | R38-550 |
|------------------------------|-----------|--------------------|---------|---------|---------|
| Nominal diameter             | $d_{nom}$ | [mm]               | 38      |         |         |
| Actual diameter              | $d_a$     | [mm]               | 37.8    |         |         |
| Inner diameter <sup>1)</sup> | $d_i$     | [mm]               | 22      | 19      | 17      |
| Nominal cross-sectional area | $A_s$     | [mm <sup>2</sup> ] | 660     | 750     | 800     |
| Nominal weight <sup>2)</sup> | $m$       | [kg/m]             | 5.2     | 5.9     | 6.3     |

<sup>1)</sup> Value: only informative; tolerance:  $\pm 2.0$  mm

<sup>2)</sup> Admissible tolerance: -3% to +9%

The bars have a continuous left-hand thread in accordance with the ISO 10208 thread template and material deposited with DIBt

### Mechanical properties

| Hollow bar type                           |             |      | R38-420    | R38-500 | R38-550 |
|-------------------------------------------|-------------|------|------------|---------|---------|
| Load at 0.2% yield strength <sup>3)</sup> | $F_{0.2,k}$ | [kN] | 350        | 400     | 450     |
| Breaking load <sup>3)</sup>               | $F_{t,k}$   | [kN] | 420        | 500     | 550     |
| Elongation at maximum load <sup>3)</sup>  | $A_{gt}$    | [%]  | $\geq 4.0$ |         |         |

<sup>3)</sup> Value corresponds to the 5% quantile

The design value for the elasticity modulus is 200,000 N/mm<sup>2</sup>.

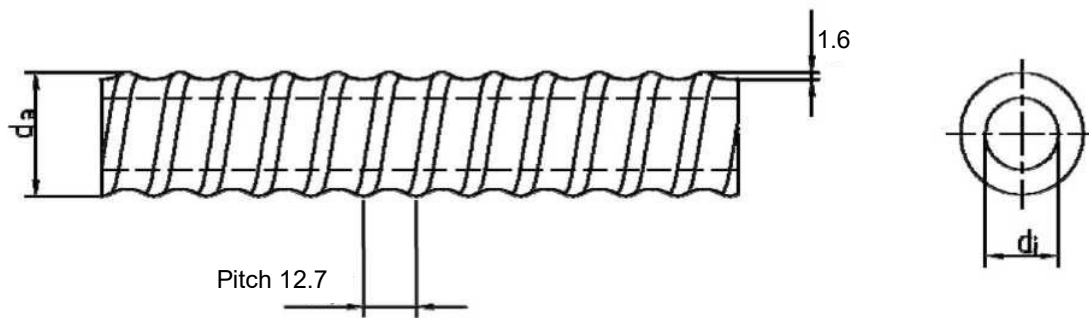
DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

Geometry and mechanical properties of DYWI® Drill Series R38

Annex 2

## DYWI® Drill Series R51

### Geometry



| Hollow bar type              |           |                    | R51-550 | R51-660 | R51-800 |
|------------------------------|-----------|--------------------|---------|---------|---------|
| Nominal diameter             | $d_{nom}$ | [mm]               | 51      |         |         |
| Actual diameter              | $d_a$     | [mm]               | 49.8    |         |         |
| Inner diameter <sup>1)</sup> | $d_i$     | [mm]               | 35      | 33      | 29      |
| Nominal cross-sectional area | $A_s$     | [mm <sup>2</sup> ] | 890     | 970     | 1150    |
| Nominal weight <sup>2)</sup> | $m$       | [kg/m]             | 7.0     | 7.7     | 9.0     |

<sup>1)</sup> Value: only informative; tolerance:  $\pm 2.0$  mm

<sup>2)</sup> Admissible tolerance: -3% to +9%

The bars have a continuous left-hand thread in accordance with the ISO 10208 thread template and material deposited with DIBt

### Mechanical properties

| Hollow bar type                           |             |      | R51-550    | R51-660 | R51-800 |
|-------------------------------------------|-------------|------|------------|---------|---------|
| Load at 0.2% yield strength <sup>3)</sup> | $F_{0.2,k}$ | [kN] | 450        | 540     | 640     |
| Breaking load <sup>3)</sup>               | $F_{t,k}$   | [kN] | 550        | 660     | 800     |
| Elongation at maximum load <sup>3)</sup>  | $A_{gt}$    | [%]  | $\geq 4.0$ |         |         |

<sup>3)</sup> Value corresponds to 5% quantile

The design value for the elasticity modulus is 200,000 N/mm<sup>2</sup>.

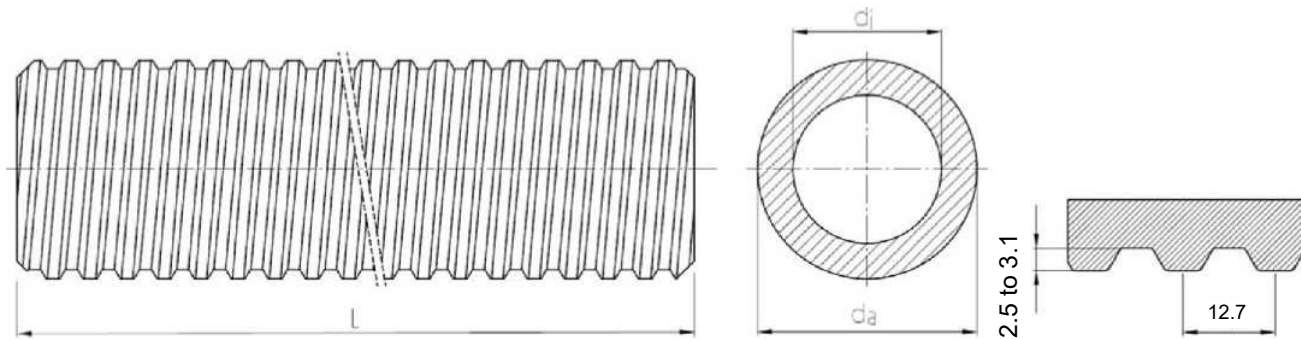
DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

Geometry and mechanical properties of DYWI® Drill Series R51

Annex 3

## DYWI® Drill Series T76

### Geometry



| Hollow bar type              |           |                    | T76-1300 | T76-1650 | T76-1900 |
|------------------------------|-----------|--------------------|----------|----------|----------|
| Nominal diameter             | $d_{nom}$ | [mm]               | 76       |          |          |
| Actual diameter              | $d_a$     | [mm]               | 74.6     | 75.6     | 75.6     |
| Inner diameter <sup>1)</sup> | $d_i$     | [mm]               | 56       | 52       | 47       |
| Nominal cross-sectional area | $A_s$     | [mm <sup>2</sup> ] | 1,590    | 1,975    | 2,360    |
| Nominal weight <sup>2)</sup> | $m$       | [kg/m]             | 12.5     | 15.5     | 18.5     |

<sup>1)</sup> Value: only informative; tolerance:  $\pm 2.0$  mm

<sup>2)</sup> Admissible tolerance: -3% to +9%

The bars have a continuous left-hand thread in accordance with the DSI AT thread template plant standard and material deposited with the DIBt

### Mechanical properties

| Hollow bar type                           |             |      | T76-1300   | T76-1650 | T76-1900 |
|-------------------------------------------|-------------|------|------------|----------|----------|
| Load at 0.2% yield strength <sup>3)</sup> | $F_{0.2,k}$ | [kN] | 1,000      | 1,200    | 1,500    |
| Breaking load <sup>3)</sup>               | $F_{t,k}$   | [kN] | 1,300      | 1,650    | 1,900    |
| Elongation at maximum load <sup>3)</sup>  | $A_{gt}$    | [%]  | $\geq 4.0$ |          |          |

<sup>3)</sup> Value corresponds to 5% quantile

The design value for the elasticity modulus is 200,000 N/mm<sup>2</sup>.

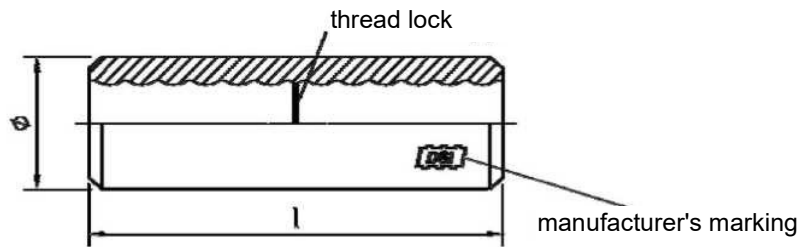
DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

Geometry and Mechanical Properties of DYWI® Drill Series T76

Annex 4

## DYWI® Drill Couplers

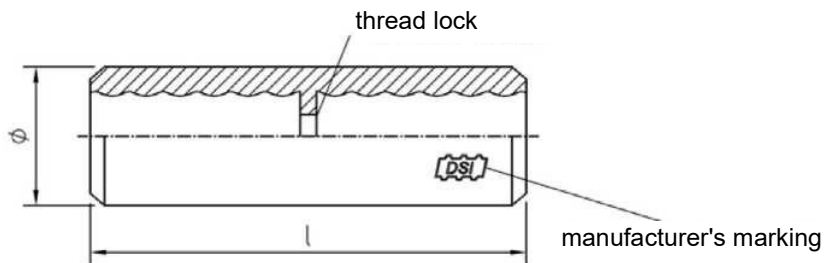
### Steel coupler



| Hollow bar type | Length l [mm] | Diameter Ø [mm] | Weight m [kg] |
|-----------------|---------------|-----------------|---------------|
| <b>R32</b>      | 150           | 42              | 0.8           |
| <b>R38</b>      | 170           | 51              | 1.4           |
| <b>R51</b>      | 200           | 63              | 2.0           |
| <b>T76</b>      | 210           | 95              | 4.2           |

Workshop drawings with dimensions and material deposited with the DIBt

### Cast coupler



| Hollow bar type | Length l [mm] | Diameter Ø[mm] | Weight m [kg] |
|-----------------|---------------|----------------|---------------|
| <b>R32</b>      | 160           | 42             | 0.9           |
| <b>R38</b>      | 180           | 51             | 1.4           |
| <b>R51</b>      | 200           | 63             | 2.0           |
| <b>T76</b>      | 220           | 98             | 5.6           |

Workshop drawings with dimensions and material deposited with the DIBt

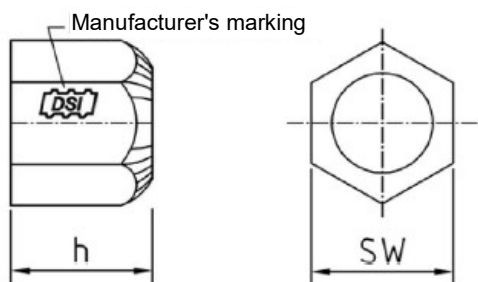
DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

**DYWI® Drill Couplers**

Annex 5

## DYWI® Drill Couplers

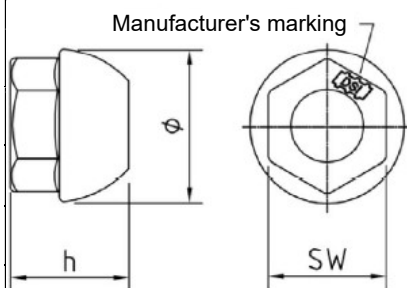
### Steel coupler



| Hollow bar type | Wrench size SW [mm] | Height h [mm] |
|-----------------|---------------------|---------------|
| R32             | 46                  | 55            |
| R38             | 55                  | 70            |
| R51             | 75                  | 80            |
| T76             | 100                 | 80            |

Workshop drawings with dimensions and material deposited with the DIBt

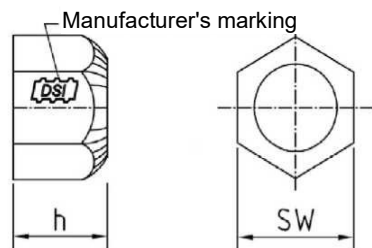
### Domed nut



| Hollow bar type | Wrench size SW [mm] | Height h [mm] | Diameter Ø[mm] |
|-----------------|---------------------|---------------|----------------|
| R32             | 46                  | 46            | 60             |
| R38             | 55                  | 65            | 70             |
| R51             | 75                  | 70            | 90             |
| T76             | 100                 | 85            | 148            |

Workshop drawings with dimensions and material deposited with the DIBt

### Lock nut



| Hollow bar type | Wrench size SW [mm] | Height h [mm] |
|-----------------|---------------------|---------------|
| R32             | 46                  | 30            |
| R38             | 55                  | 35            |
| R51             | 75                  | 40            |
| T76             | 100                 | 40            |

Workshop drawings with dimensions and material deposited with the DIBt

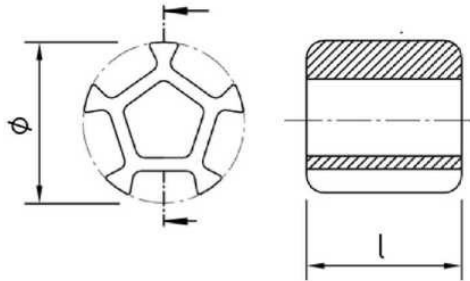
DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

DYWI® Drill Nuts

Annex 6

## DYWI® Drill Spacer

### Spacer



| Hollow bar type | Diameter Ø [mm] | Length l [mm] |
|-----------------|-----------------|---------------|
| <b>R32</b>      | 73              | 40            |
| <b>R38</b>      | 84              | 45            |
| <b>R51</b>      | 95              | 60            |
| <b>T76</b>      | 136             | 60            |

Workshop drawings with dimensions and material deposited with the DIBt

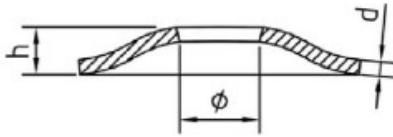
DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

**DYWI® Drill Spacer**

Annex 7

## DYWI® Drill Spacer

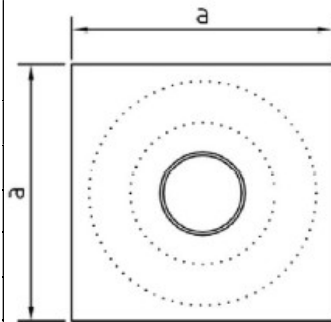
### Spherical plate



for domed nut

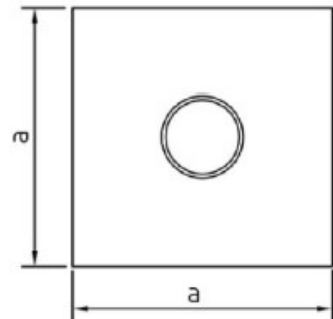
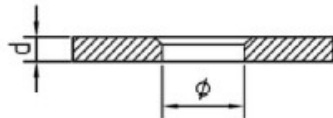
| Hollow bar type | Width a [mm] | Thickness d [mm] | Opening $\phi$ [mm] | Height H [mm] |
|-----------------|--------------|------------------|---------------------|---------------|
| <b>R32</b>      | 150          | 10               | 43                  | 31            |
| <b>R38</b>      | 200          | 12               | 53                  | 31            |
| <b>R51</b>      | 200          | 15               | 75                  | 31            |

for steel nut



| Hollow bar type | Width a [mm] | Thickness d [mm] | Opening $\phi$ [mm] | Height H [mm] |
|-----------------|--------------|------------------|---------------------|---------------|
| <b>R32-210</b>  | 150          | 8                | 34                  | 31            |
| <b>R32-250</b>  | 150          | 8                | 34                  | 31            |
| <b>R32-280</b>  | 200          | 10               | 34                  | 31            |
| <b>R32-320</b>  | 200          | 12               | 34                  | 31            |
| <b>R32-360</b>  | 200          | 12               | 34                  | 31            |
| <b>R32-40Q</b>  | 200          | 12               | 34                  | 31            |
| <b>R38-420</b>  | 200          | 12               | 41                  | 31            |
| <b>R38-500</b>  | 200          | 15               | 41                  | 31            |
| <b>R38-550</b>  | 200          | 15               | 41                  | 31            |
| <b>R51-550</b>  | 200          | 15               | 55                  | 31            |
| <b>R51-660</b>  | 200          | 15               | 55                  | 31            |
| <b>R51-800</b>  | 200          | 20               | 55                  | 31            |

### Flat plate



Workshop drawings with dimensions and material deposited with the DIBt

| Hollow bar type | Width a [mm] | Thickness d [mm] | Opening $\phi$ [mm] |
|-----------------|--------------|------------------|---------------------|
| <b>R32</b>      | 140          | 30               | 40                  |
| <b>R38</b>      | 160          | 40               | 48                  |
| <b>R51</b>      | 200          | 40               | 64                  |
| <b>T76-1300</b> | 200          | 35               | 80                  |
| <b>T76-1650</b> | 220          | 40               | 80                  |
| <b>T76-1900</b> | 240          | 40               | 80                  |

Workshop drawings with dimensions and material deposited with the DIBt

DYWI® Drill Hollow Bars with Connections and Anchorages as Load-Carrying Element in Geotechnical Engineering

DYWI® Drill Bearing Plates

Annex 8

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