Important

These Operating Instructions are to be read and complied with prior to the installation and operation of the THIELE sprocket assembly as part of the conveying system (hereafter referred to as the 'conveyor').

It is also essential to follow the operating and repair instructions for the installation to which the sprocket assembly is being fitted.

1 GENERAL

This product from THIELE GmbH & Co. KG has been manufactured to state-of-the-art standards and in accordance with generally recognised safety rules. However, its operation may cause danger to the life of the user and/or to third parties and may result in damage to the installation and other property.

The following basic rules are therefore to be followed at all times:

- Regard the Operating Instructions as part of the product.
- Ensure that the Operating Instructions are kept in a safe place for the entire operating life of the installation.
- Pass the Operating Instructions on to any subsequent owner of the product.
- Always use the latest valid copy of the Operating Instructions, i.e. the version with the highest revision index.
- Carefully read through these Operating Instructions before attempting to carry out any work on the installation.
- Always follow the directions and instructions contained therein.
- Familiarise yourself with the terms of use before operating the installation.
- Refrain from any working practices that could pose a risk to safety.
- All personnel assigned to work with or on the installation, or its components, must first have read and understood the Operating Instructions and safety regulations.

2 RELATED DOCUMENTS

The operator is required to append to these Operating Instructions the locally valid accident prevention and environmental protection regulations.

Always observe the fitting and operating instructions for the installation and its components and pay particular attention to the safety information.

The following documents are attached to these Operating Instructions:

- declaration of incorporation and declaration of conformity,
- THIELE drawing no. Z400-02277-00,
- safety data sheet on the oil used.

3 DIRECTIONS FOR THE OPERATOR

3.1 General

Note

The operator of the installation is deemed to be the person who operates the installation and uses it for its intended purpose, or who allows it to be operated by a suitable and properly trained person.

Operators of the installation must comply with all valid and relevant safety, accident prevention and environmental protection regulations.

This particularly includes the following provisions:

- Operators are to keep themselves informed of the applicable health and safety regulations and must undertake a risk assessment to determine any hazards resulting from the particular conditions that apply at the operating site. These are to be transposed into operating instructions for all the different lifetime phases of the installation (e.g. transport, fitting, operation, maintenance, etc.).
- Operators are to monitor the installation throughout its service life in order to check that the operating instructions they have prepared conform to the latest technical standards. They must also amend these instructions if necessary.
- Operators are to regulate and define in a clear manner the responsibilities of the personnel involved in each lifetime phase of the installation.
- Operators are to ensure that every person involved with the installation has read and understood the relevant documentation.
  Operators are required to organise regular briefing sessions for their staff and to keep them informed of all potential risks and hazards.
  The operator is also responsible for ensuring that the installation is always kept in a proper working order.
  This includes the following:
- All safety equipment must be regularly checked for proper functioning and completeness.
- Personnel are to be issued with the required protective equipment.
- Maintenance schedules and servicing intervals are to be strictly observed.

3.2 Warranty

These Operating Instructions contain all the basic information needed to operate the installation in a safe and appropriate manner and in accordance with its intended purpose. THIELE accepts no responsibility for personal injury or damage to property resulting from failure to observe the directions contained in these Operating Instructions, and in such cases our warranty will be rendered invalid. All warranty claims are to be submitted directly and immediately to THIELE.

Wear-prone parts are not covered under the terms of this warranty.

The warranty claim shall become null and void:

- in the event of improper use of the installation
- in the event of failure to use original spare parts and accessories
- if the equipment is modified or rebuilt without THIELE's prior written consent
- in the event of there being defective upstream systems and connecting equipment that are outside the scope of the delivery and services performed by THIELE.

3.3 Exclusion of liability

All the technical information, data and recommendations given in this Operating Manual meet the state-of-the-art at the time of printing and are provided to the best of our knowledge, taking account of previous experience and findings.

THIELE reserves the right to make technical changes as part of the ongoing development of the product referred to in these Operating Instructions. No claims can therefore be accepted on the basis of the technical data, illustrations and descriptions contained in the aforesaid Instructions.

THIELE will not be held liable for any damage or malfunctions resulting from operational errors, design modifications, failure to observe these operating instructions or incorrect repair work. It should be clearly understood that only spare parts and accessories authorised by THIELE are to be used in conjunction with this product. The fitting and use of non-authorised spares and accessory parts, and the carrying out of unapproved modifications, are not allowed for safety reasons and will release THIELE from liability for any resulting damage.

THIELE shall only be liable for potential defects and omissions, to the exclusion of further claims arising in the context of the warranty obligations detailed in the main agreement.

Claims for compensation for damage, irrespective of their legal grounds, shall be excluded.

The diagrams, images and drawings contained in these Operating Instructions are not shown to scale and may differ from the supplied equipment and from any spare parts that are ordered.

4 COPYRIGHT PROTECTION AND TEXT ILLUSTRATIONS

These Operating Instructions are to be treated as confidential and should only be used by authorised personnel. They should only be made available to third parties with THIELE's written permission. All documentation associated with these Instructions are protected under the terms of the German Copyright Act.

The transmission and reproduction of any of these documents, even in the form of extracts, and their use and the disclosure of their contents, are expressly forbidden unless this has been explicitly agreed. Any contraventions are liable to prosecution and will result in claims for compensation.

THIELE specifically retains all industrial property rights.

Warnings and notices

Warnings and notices are set off from the main text and are specially identified with appropriate pictograms. **The safety notices must always be read in full!**

The warnings and notices contained in these Operating Instructions are ranked according to their hazard rating using the following identifying symbols:

	Danger Failure to observe these instructions may result in serious bodily injuries and possibly death.
	Caution Failure to observe these instructions may result in damage to the installation or to the environment.
	**Note** Gives useful advice on operating the installation along with additional product information.

Hands-on instructions

Hands-on instructions constitute a request to perform a particular activity.

Such instructions can be recognised by the arrow symbol that precedes the text.

Example:

➢ Apply grease to the contact faces of the nuts and threaded bolt.

5 SAFETY INFORMATION

The safety information is presented as follows:

	Danger (= signal word) Source of the danger Consequence of the danger Remedial measure(s)

5.1 General safety information

Safety information warns of specific dangers and helps prevent injury to persons and damage to property.

Before using the installation ensure that you have read and understood all the safety information.

Note

THIELE cannot accept liability for personal injuries and damage to property resulting from a failure to observe the directions given in these Operating Instructions and responsibility in such cases will be borne by the operator.

- Always observe the latest regulations on health and safety.
- Adhere strictly to the safety information given in these Operating Instructions.
- Immediately rectify any faults or malfunctions that could affect the safety of persons or equipment.
- Ensure that all safety information and hazard warnings are kept in a legible condition on or alongside the installation.
- Refrain from wearing loose clothing, rings or jewellery when working with the installation, as these could get caught up in the machinery.
- Do not remove or modify any of the safety or protection equipment fitted to the installation. This applies particularly to devices that are intended to protect against dust, noise and injury.
- During changeover work any heavy items and large assemblies should be attached and secured to hoisting equipment in such a way that they cannot pose a danger.
- All injuries, no matter how minor, are to be reported to a supervisor.

5.2 Safety information for operating purposes

The sprocket assembly cannot be operated as a separate unit and only becomes a functioning piece of machinery when it has been connected up to other components.

- Always operate the installation in accordance with the regulations, in compliance with the instructions contained in the Operating Instructions and only when it is in perfect technical working order and when you are aware of the safety issues and potential hazards.
- Ensure that all safety equipment forming part of the installation has been fitted and is in proper working order.
- Always wear personal protective equipment when working on or with the machine and its components.

Note

It is the responsibility of the operator to ensure that personal protective equipment is worn.

- Only operate the installation when you are feeling physically fit.
- Before attempting to use the installation ensure that no one is present within the danger area. The latter is to be defined and marked out by the operator prior to commissioning.
- In the event of a malfunction immediately shut down the installation and rectify the problem as quickly as possible.

5.3 Mandatory signs

The following mandatory signs are used in these Operating Instructions:

Required

- wear ear defenders

Required

- wear safety gloves

Required

- wear protective clothing

6 PROPER AND APPROPRIATE USE

This sprocket assembly is only intended for the underground transportation of material in conjunction with a chain-conveyor drive frame designed for a 48x152, twin strand inboard chain system with a chain centre distance of 500 mm.

The operating life of the installation will depend to a large degree on how the individual components are treated, on whether the servicing and maintenance intervals have been respected and on whether the equipment has been used within the specified operating parameters. It is therefore not possible to be specific about service life expectancy.

Employing the installation for a different purpose or for operations that exceed its capabilities will be deemed as contrary to the designated use. The manufacturer will not be held liable for any damage resulting from such actions. The manufacturer will also be exempt from any warranty claims if the equipment is modified in any way.

7 IMPROPER USE

Any use other than that described in Section 6 shall be considered as being improper and is prohibited.

THIELE cannot accept liability for damages arising as a result of improper use of the equipment.

8 PERSONNEL

These Operating Instructions have been drawn up for the use of operators, fitters and maintenance engineers, and particularly those who carry out the following types of work on the sprocket assembly:

- fitting and removal
- operational routines
- testing
- servicing
- transport

Note

Persons who are under the influence of drugs, alcohol or medicines that can affect their responsiveness must under no circumstances carry out work with or on the sprocket assembly or its connected equipment and components.

The installation must only be operated by properly qualified personnel. Properly qualified personnel within the meaning of these Operating Instructions are those who are familiar with the workings and operation of the product and who possess the following:

- specific training in the use of this installation and
- a knowledge of all relevant fitting and operating instructions.

Work is only to be performed by trained personnel, which within the meaning of these Operating Instructions means those who are familiar with the installation, fitting, maintenance and decommissioning of the product and who possess the following qualifications:

- training in mechanical engineering (as a mechanic or mechatronics technician) or
- training in mining engineering.

Work in other areas, such as transport, cleandown and waste disposal, must only be undertaken by persons who have been given appropriate instruction by the operator.

9 OPERATIONAL INTERFACES

Operational interfaces with other components, machines and installations include:

- Workspace
  The machine dimensions and the working space required for the operators and fitters, including storage areas for tools and materials, have to be established.
- Conveyor drive frame
- Drive components (gearbox, motor, coupling, etc.)
- Chain assembly
  When detaching the chain assembly always stand to the side of it.

The relevant workspace must be properly supported and secured.

Special care is needed when working on chains that are under tension.

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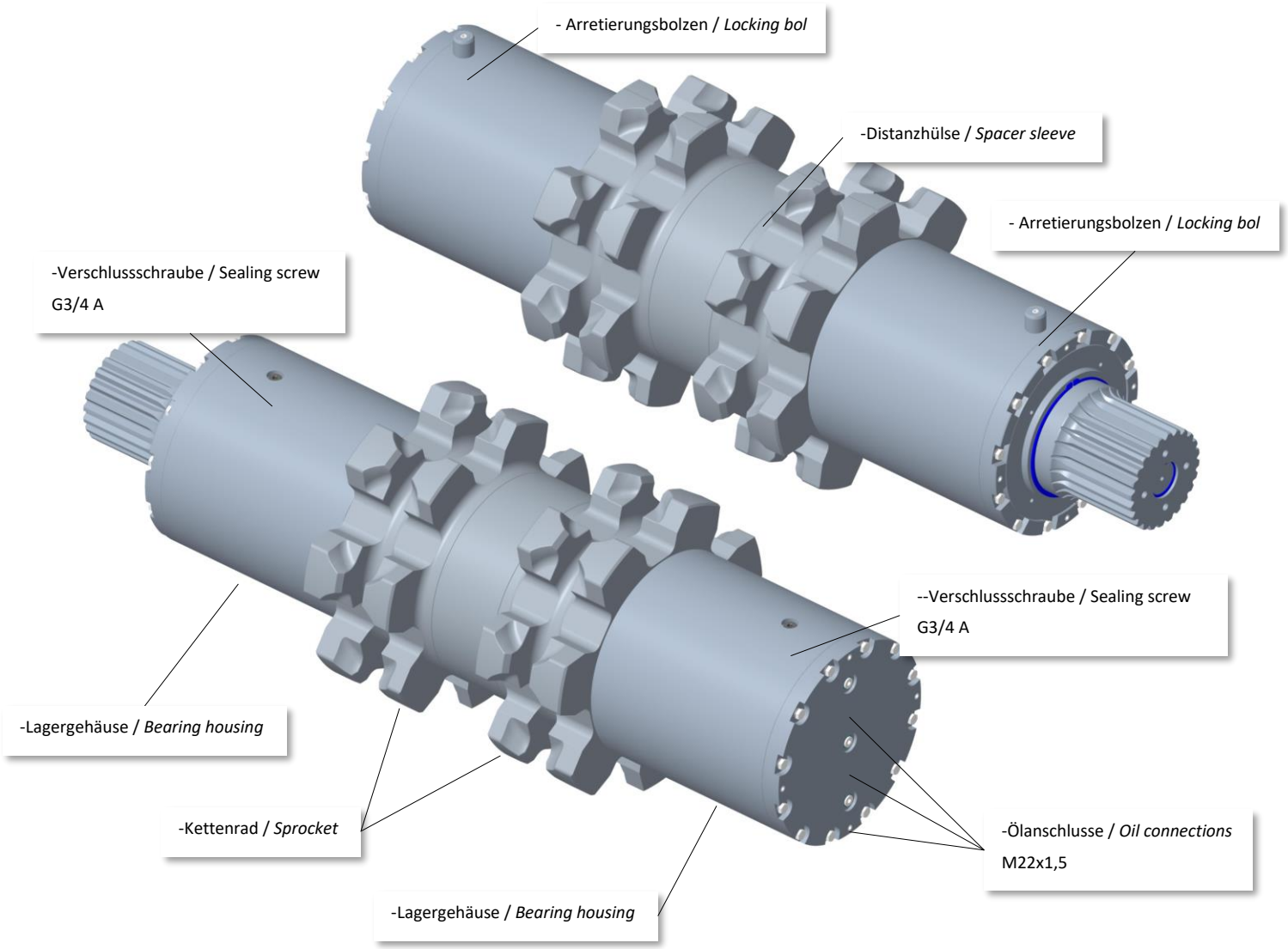
10 SPROCKET ASSEMBLY - MAIN FEATURES

The main components of the sprocket assembly are shown in the drawing below:



11 ESERVATION AND STORAGE

11.1 Corrosion protection

All components have a temporary anti-corrosion coating that provides protection for about six months (from the date of dispatch and when stored indoors).

11.2 Dirt and moisture

Do not store the assembly outside.

Ensure that all parts of the equipment are protected from damp and dirt, e.g. by covering with tarpaulins.

12 TRANSPORT

Danger

Incorrect attachment of loads

Serious bodily injuries or death

- Only use suitable and approved hoists and slings. Always observe the safety information.
- Take care to ensure that slings are properly attached before transport.

Only experienced persons are to be assigned to attaching loads and supervising personnel engaged in transport and loading work.

Always observe the following storage and transport rules:

- Do not store materials or components along travel routes or in your working area.
- Notify those concerned of the route and likely duration of the transport operation.
- Ensure that all transport fastenings have been properly attached.
- Ensure that all moving parts are securely fastened in place.
- Never stand or walk below unsecured components or suspended loads.
- Only attach slings to the specially provided anchor points. Always observe the different load limits for slings and anchor points.
- Only use slings that are in perfect condition and are compatible with the type of load in question.
- When slinging circular components always use transport belts, not chains or wire ropes.
- Do not damage machined or finished surfaces, e.g. on shafts, seals, etc.
- When transporting floor-level conveying systems ensure that the centre of gravity is kept as low as possible.

13 FITTING AND REMOVAL

13.1 General

Caution

Incorrect fitting and removal

Material damage

Observe the relevant fitting and operating instructions.

- All mechanical work is only to be carried out by properly qualified persons.
- Adapt the sequence of operations to suit the individual locations. Before commencing work draw up a suitable plan with a detailed listing of the individual transport and assembly stages.
- Tightening torques, unless separately specified, are given in Table 1.
- All bolts, fitting holes and locking rings are to be coated with a suitable grease prior to assembly.

13.2 Tools and appliances

Assembly can be carried out using conventional tools, e.g.

- lifting equipment
- slings
- open-ended wrenches (10 mm - 46 mm)
- ring spanners (10 mm - 46 mm)
- torque wrench.

No tools are supplied with the installation.

13.3 Working sequence for assembly and dismantling

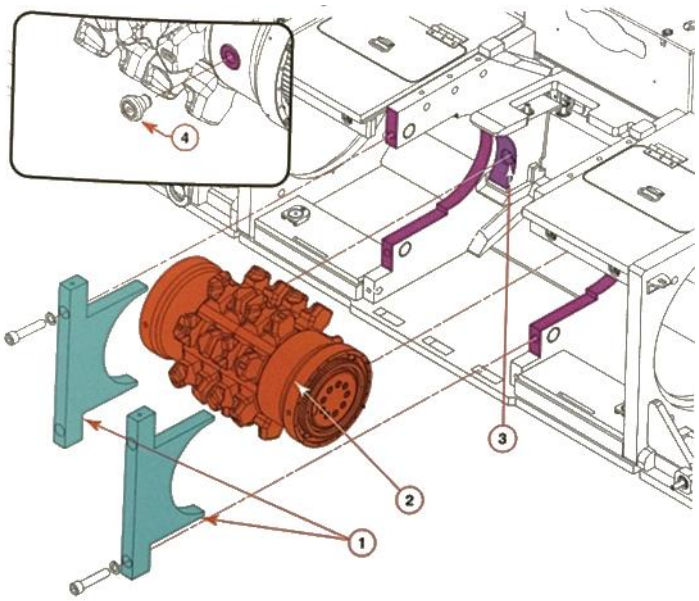
The sequence of work as described here is given as an example only.

It may be adapted to suit particular situations, based on individual experience.

Note

Ensure that there is sufficient space and a safe underground environment in which to carry out the assembly work.

Typical basic layout:



1. side plates
2. sprocket assembly
3. seating for anti-torsion insert
4. stud bolt, anti-torsion insert

13.4 Removal

Recommended sequence:

- Switch off the drive system and secure it against unintentional restart.
- Slacken the chain and detach the chain assembly.
- Secure the components against accidental movement.
- If necessary, remove any cover plates that may impede the dismantling process.
- Detach the chain from the sprocket assembly.
- Remove the plates on either side of the drive frame.

Danger

If the installation is on a gradient there is a risk that the sprocket assembly can slip out of the drive frame unexpectedly.

Serious bodily injuries or death

Before removing the side plates secure the sprocket assembly with a belt or similar to prevent it slipping out inadvertently.

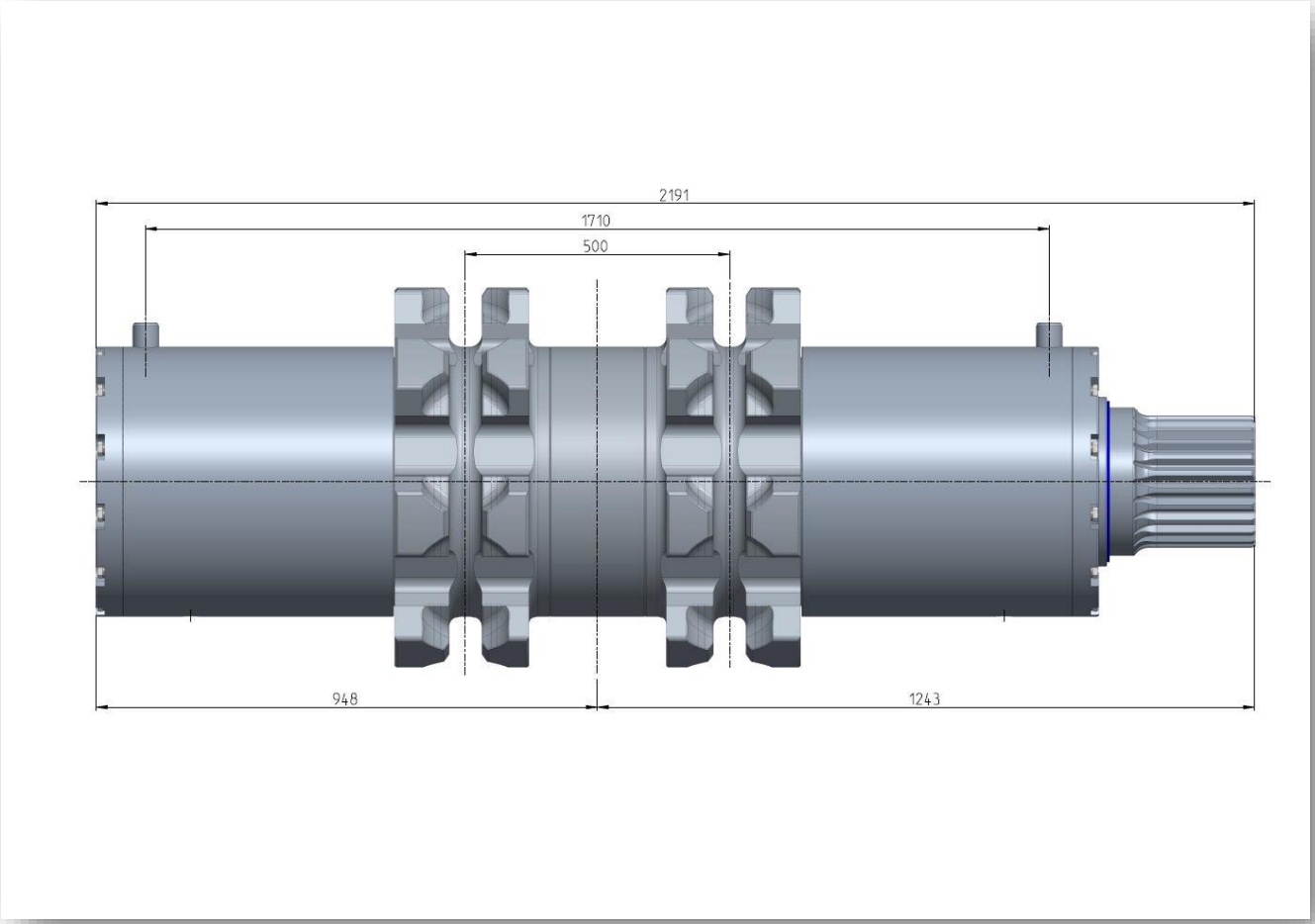
- To remove the sprocket assembly first support it with lifting tackle and slings and then employ a ratchet hoist to withdraw it horizontally from the guideway of the drive frame. If the drive frame is tilted take special care to ensure that no undue strain is put on the sprocket assembly.

13.5 Fitting

Recommended sequence of work:

The sprocket assembly is fitted in the reverse order to its removal.

- Before fitting a new sprocket assembly clean out the guideways and seats for the anti-torsion inserts and clean all the sliding surfaces, then apply Molykote 40 paste, or a similar lubrication grease, to all these areas.
- In addition, check the bolt spacing in the drive frame.



Caution

Contaminated or mechanically damaged guideways and seats

Fitting problems, material damage

Take care to ensure that the guideways, the seats for the anti-torsion inserts and the sliding surfaces on the drive frame and sprocket assembly are all free from dirt and contamination.

- Fix lifting slings to the drive unit and support it with lifting gear.

Danger

Incorrect slinging of loads

Serious bodily injuries or death If the installation is on a gradient there is a risk that the sprocket assembly can slip out of the drive frame unexpectedly. Use belts or similar to secure the assembly until the side plates have been fitted to the drive frame.

- Raise the sprocket assembly so that it lines up with the drive frame.
- Use a ratchet hoist to manoeuvre the sprocket assembly into the drive frame.
- Ensure that tools and other extraneous materials are cleared away from the conveyor before it is started up again.
- Fit the chain and tension it to the manufacturer's specifications.
- Tighten up the bolts to the prescribed torque settings.

14 START-UP

14.1 General

Caution

Risk of omissions prior to start-up

Machine damage and/or loss of warranty

Check all safety equipment and emergency stop devices

Ensure that the following measures have been taken prior to start-up:

- Examine the installation for signs of damage that may have occurred during shipment or assembly. Any damage found must be repaired before the installation is started-up.
- Complete the documentation by adding the instructions relating to all the components used.
- Establish a danger area for the entire installation. The layout of this zone will depend on the local operating conditions.
- Instruct the operating personnel in how to handle the installation. Draw attention to the proper and appropriate use of the machine and warn against misuse and faulty operation.
- Give appropriate instructions to the maintenance and servicing personnel.
- Provide instruction sessions at regular intervals and keep a record of them.
- Fit all the required safety equipment, including emergency-stop devices, acoustic start-up warning etc., and check that they are all functioning.
- Remove all tools and appliances from the danger area.
- Check that each bolt has been tightened to the correct torque setting (refer to Table 1).

Note

Replace any damaged or defective components. Notify the manufacturer of any defects found.

Maintenance and repair work must only be undertaken by the manufacturer or by an approved firm.

14.2 No-load test run

Danger

Walking or standing in the danger area

Serious bodily injuries or death

Ensure that no one is present within the danger area of the installation. Certain hazards can arise during the trial run, for example as a result of assembly errors. Keep a safe distance away from the installation.

When the installation has been checked over and any defects put right proceed to carry out a trial run with no load. This test should last at least 30 minutes.

➢ During the trial run check the following:

- the smooth action of the chain as it enters and leaves the sprocket
- the temperature of the housings (position 9)
- the correct functioning of the chain stripper

After the trial run:

➢ Secure the installation against accidental start-up and carry out the following tasks:

- examine the installation for potential defects
- check the bolt connections
- check for signs of leakage at the housings (position 9)
- rectify any faults or defects found

14.3 Test run

Danger

Walking or standing in the danger area

Serious bodily injuries or death

Ensure that no one is present within the danger area of the installation. Certain hazards can arise during the trial run, for example as a result of assembly errors. Keep a safe distance away from the installation.

➢ Carry out a test run of about 1 hour with the installation under load and observe the following:

- chain circulation with load
- functioning of the chain stripper

After the test run:

➢ Thoroughly examine the installation again for assembly errors, signs of damage and other defects.

➢ Check for leaks at the housings.

➢ Check the temperature of the housings.

➢ If no further defects are found the installation can be cleared for service.

15 OPERATION

Danger

Walking or standing in the danger area

Serious bodily injuries or death

Ensure that no one is present within the danger area when the installation is started up.

The installation should only be operated by persons who have an overall technical understanding of the equipment. This includes knowing

- which safety devices are fitted to the installation,
- where these safety devices are to be found and
- how these safety devices are operated.

16 MAINTENANCE AND REPAIR

16.1 General

Danger

The installation is running

Serious bodily injuries or death

Repair and maintenance work must only be carried out when the installation has been shut down and has been secured against accidental start-up.

Caution

Inadequate maintenance

Machine damage and/or loss of warranty

Keep the installation maintained in accordance with the servicing instructions.

Caution

Low grease level

Machine damage and/or loss of warranty

Check regularly for signs of leakage.

In the event of significant grease loss determine the cause, shut down the installation and re-apply grease, along with other measures if necessary.

Environmental protection

All waste fluids and consumables are to be disposed of in a safe and environment-friendly way. Observe all local regulations applying to the disposal of consumable substances.

Note

THIELE cannot accept any liability for damage suffered as a result of poor servicing and maintenance.

Regular servicing and maintenance increases machine reliability and prolongs the operating life of the sprocket assembly. Ensure that the servicing and maintenance personnel carry out inspections on a regular basis.

If safety devices have to be removed ensure that they are re-fitted and checked immediately after the work has been completed.

Danger

Incorrect slinging of loads

Serious bodily injuries or death

Only use slings and lifting gear that are suitable for the job and in perfect working order.

When transporting individual loads and larger machine assemblies take care to see that these are properly attached to slings and lifting gear and secured in such a way that presents no risks.

- ➢ Damaged components must be replaced immediately.
- ➢ Notify the manufacturer of any defects found.

The installation must only be re-started when all work has been completed.

16.2 Tools and appliances

Servicing and maintenance work can be carried out using conventional tools, such as:

- lifting gear
- slings
- spanners (10 mm - 46 mm)
- Allen keys (5 mm -14 mm)
- socket wrenches (10 mm - 24 mm)
- depth gauge (150 mm) and calliper gauge (250 mm)
- thermometer

No tools are supplied with the installation.

16.3 Equipment inspections

- ➢ The operator is to specify the type of inspections required and their frequency and must keep a record of this.
- ➢ Ensure that the servicing and maintenance personnel carry out regular equipment checks.
- ➢ Remove all signs of dirt and contamination from the measurement points beforehand.

<u>Daily inspections:</u>

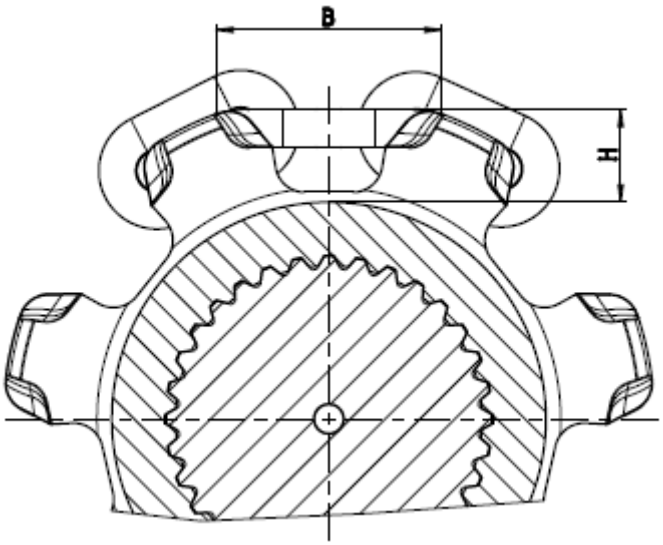
- ➢ Check the housings for overheating and signs of leakage.

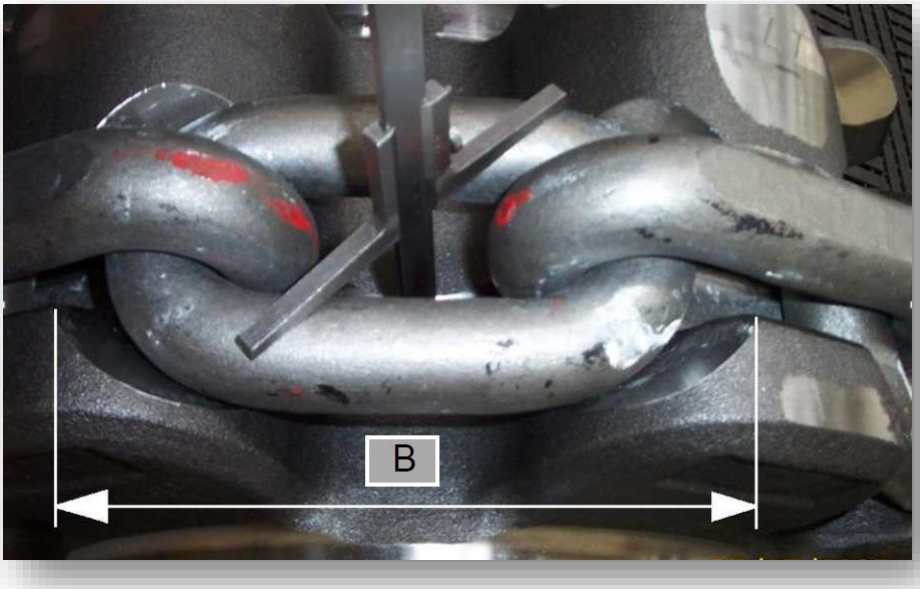
If there are signs of leakage at the sprocket assembly check to see if foreign bodies, such as pieces of wire, have become jammed between the gear rings and the housings. If this is the case, remove these objects immediately. If a persistent leak and/or loss of grease is discovered shut down the installation and replace the sprocket assembly.

High temperatures (> 80° C) at the outer surfaces of the sprocket assembly indicate internal problems. Check to establish whether other drive components are the source of the temperature increase. If this is not the case, and if the temperature remains at a high level, shut down the installation and replace the sprocket assembly.

Weekly inspection:

- Check the sprocket for signs of wear as follows:





- During initial commissioning measure with a depth gauge the distance H between the upper face of the horizontal chain link and the base of the sprocket and use this as the reference dimension.
- Check and record this dimension on a weekly basis.
- Component wear causes the horizontal chain link to sink slowly into the chain pocket.
- The sprocket assembly should be renewed, or turned over as a first-time measure, when wear has caused the measured distance to be reduced by 10 mm or more in relation to the reference dimension.
- During initial commissioning measure with a calliper gauge the distance B, as indicated, to serve as a reference dimension.
- Check and record this dimension on a weekly basis.
  The sprocket assembly must also be renewed, or turned over as a first-time measure, when the distance B has increased by 10 mm or more in relation to the reference dimension.

Maintenance:

The role of the sprockets is to reverse the direction of the chains. The high chain take-up tension subjects the chain sprockets to very high levels of wear. When the sprockets reach their wear limit they need to be reconditioned in order to ensure that they continue to function reliably.

When the wear limit has been reached the sprocket assembly can be turned about its horizontal plane one single time in order to extend its useful life. This allows the chain radii to engage with those flanks of the sprocket teeth that have not yet suffered any wear.

16.4 Filling with oil

The sprocket assembly filled with approx. 49,8 litres of oil.

When an oil change is being performed the sprocket assembly must be removed and supported securely.

Oil type (suggested): Fuchs Renolin Gear 320 VCI

First undo the outer sealing screw to release any excess pressure and allow the new oil to flow in.

Then fill with lubrication port, Grease nipple M22x1,5.

The old oil is to be collected and properly disposed of.

If necessary, tip the sprocket assembly on its end to allow all the old oil to run out.

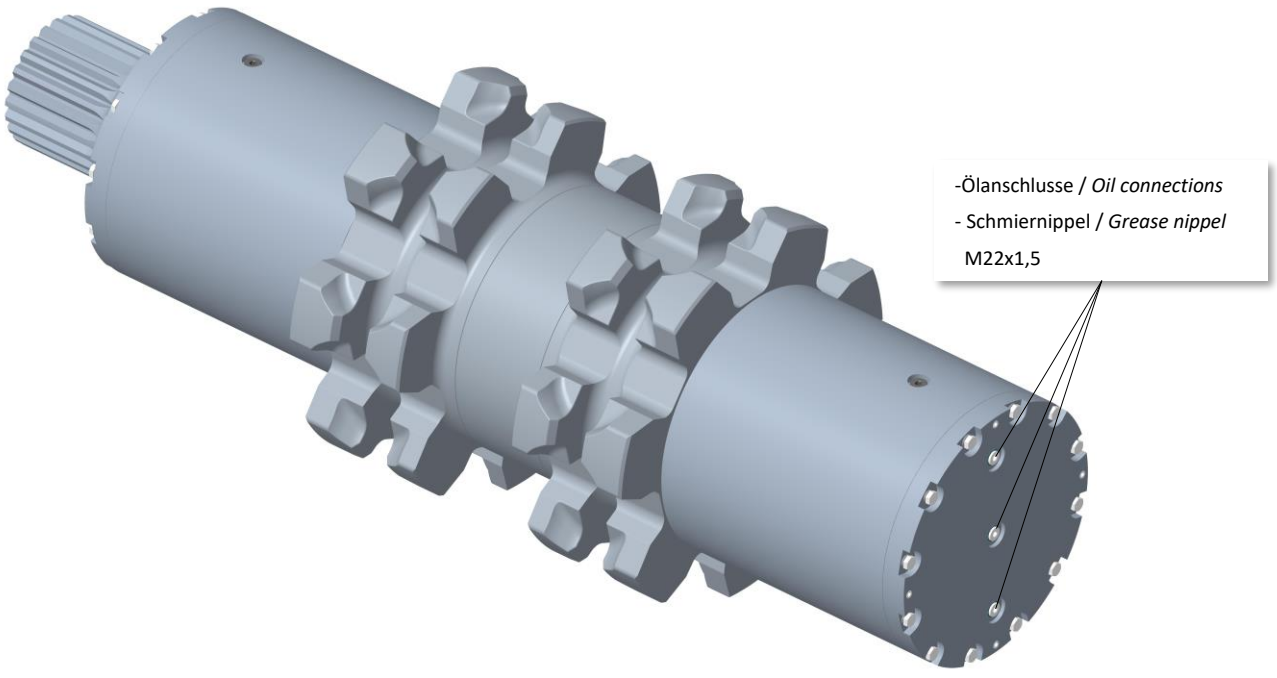
Take extra care to ensure that no dirt enters the bearing casings.

After filling with the new oil re-fit the sealing screw.

Caution

Insufficient quantity of oil/grease used when changing lubricant

Machine damage and/or loss of warranty



17 PROTECTING THE ENVIRONMENT

Environmental protection

All waste fluids and consumables are to be disposed of in a safe and environment-friendly way. Observe all local regulations applying to the disposal of consumable substances.

If the installation is to be recycled for scrap this process must be carried out by a properly qualified and authorised firm of specialists. Component parts are to be separated into the following categories: steel scrap, non-ferrous metals, plastics, oil-contaminated parts and grease-contaminated parts. These materials are then to be disposed of in accordance with local regulations.

18 RESIDUAL RISKS

This installation has been built to the latest standards using state-of-the-art technology. In spite of all the efforts taken to incorporate this as far as machine design, security precautions and other safety measures are concerned, the following residual risks may still be present:

Noise, e.g. near the sprocket when the conveyor is running

➢ wear ear defenders

Hot surfaces, e.g. in he vicinity of the sprocket assembly

➢ wear protective gloves

Sharp edges, e.g. at corners and on edges burred by wear

➢ wear protective clothing

19 PERSONNEL BRIEFINGS

The sprocket assembly must not be operated unless the personnel involved having been given appropriate instruction.

These briefing sessions should contain the following elements:

- proper and appropriate use
- description and function of the safety equipment
- fitting/removal, repair and maintenance, including transport
- procedure to be followed in the event of malfunction and emergency shutdown
- operating the installation

20 TORQUE SETTINGS

➢ Always observe the specified tightening torques.

The permissible tightening torques shown in the following table are provided for guidance purposes only (see VDI 2230:2003). The recommended tightening torques for set screws with standard metric threads as per DIN ISO 262, dimensions of hexagon head bolts as per DIN EN ISO 4014 to 4018, for µtotal = 0.14:

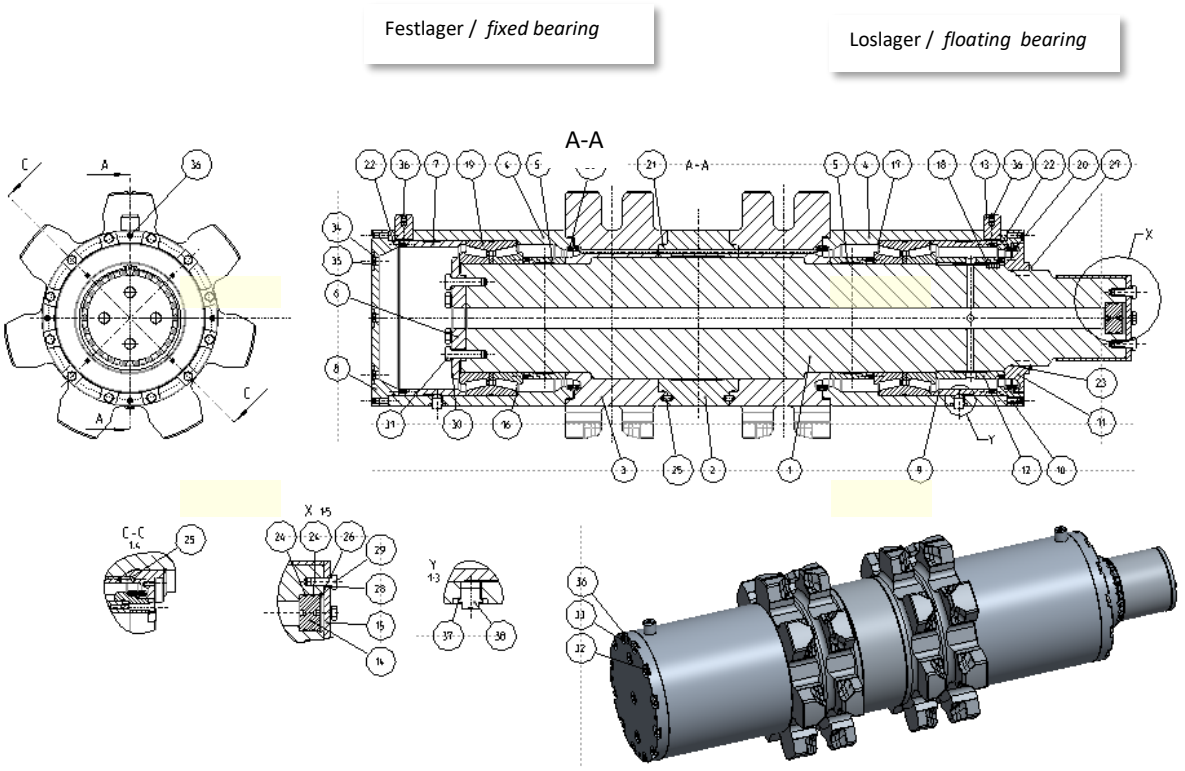
Table 1:

Thread [mm]	Pre-load force 1) Fv [kN]			Tightening torque 1) Ma [Nm]		
	Strength class			Strength class		
D	8.8	10.9	12.9	8.8	10.9	12.9
M 8	18.1	26.6	31.1	27.3	40.1	46.9
M 10	28.8	42.2	49.4	54	79	93
M 12	41.9	61.5	72.0	93	137	160
M 16	78.8	115.7	135.4	230	338	395
M 20	127	181	212	464	661	773
M 24	183	260	305	798	1 136	1 329
M 30	292	416	487	1 597	2 274	2 662
M 36	427	608	711	2 778	3 957	4 631
M12x1.25	46.8	68.8	80.5	101	149	174
M16x1.5	85.5	125	147	244	359	420
M20x1.5	144	206	241	511	728	852
M24x2	204	290	339	865	1 232	1 442
M30x2	306	440	515	1 610	2 300	2 690

1) Pre-load forces and tightening torques according to VDI 2230:2003, Table A1

Thread [BSP]	Torque (Nm)		
d	Nominal	Min.	Max.
G 1/4	20	15	25
G3/8	34	27	41
G1/2	60	42	76
G5/8	69	44	94
G3/4	115	95	135
G1	140	115	165
G1-1/4	210	140	280
G1-1/2	290	215	365
G2	400	300	500

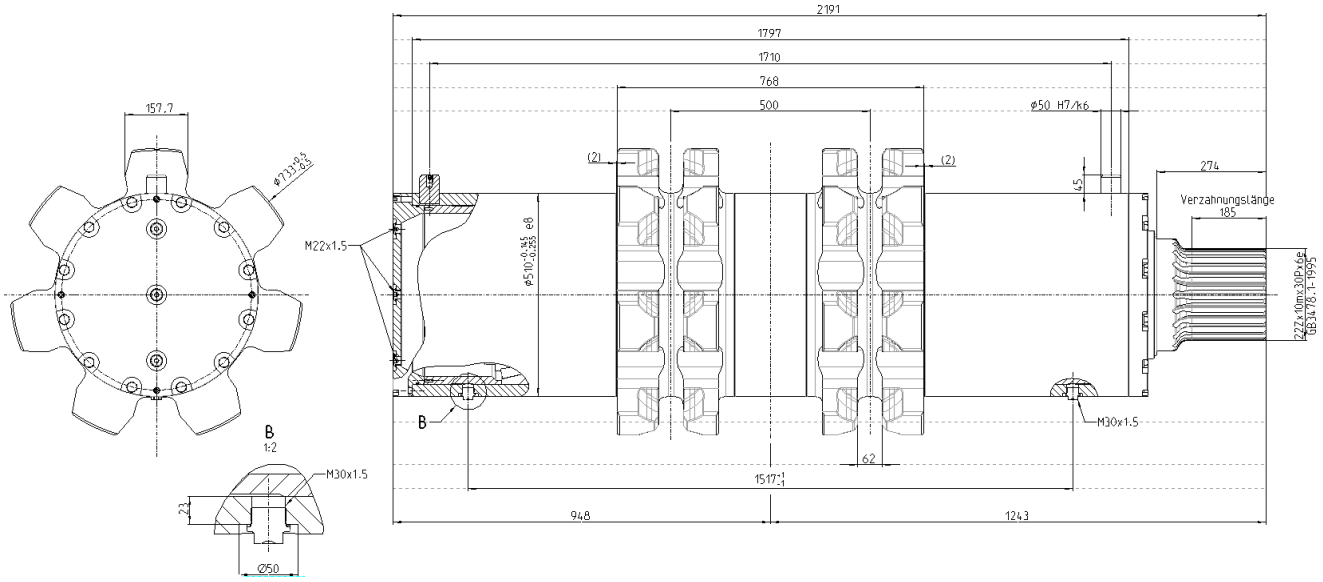
21 DRAWING Z400-02277-00



22 PARTS LIST TO Z400-02277-00

38	2	Screw plug	Z01869	DIN 910
37	2	Gasket	Z12224	DIN 7603 A
36	10	Hexagon socket set screw	Z02283	ISO 4026
35	3	Sealing screw	Z11250	DIN 908
34	3	BS-seal	Z11803	-
33	24	Hexagon bolt ISO 4014 M16x55	Z01332	ISO 4014
32	24	Wedge locking washers (Nord-Lock)	Z11230	DIN 25201
31	6	Hexagon bolt ISO 4014 M24x90	Z01349	ISO 4014
30	6	Wedge locking washers (Nord-Lock)	Z10762	DIN 25201
29	4	Hexagon bolt ISO 4017 M20x50	Z01043	ISO 4017
28	4	Wedge locking washers (Nord-Lock)	Z11233	DIN 25201
27	1	Retaining ring	Z12233	DIN 471
26	1	Retaining ring DIN 472-1 90x3	Z06596	DIN 472
25	3	Parallel pin	Z11253	ISO 2338
24	2	Around sealing ring	Z11940	H400-01805-14
23	1	Around sealing ring	Z12228	H400-02277-12
22	2	Around sealing ring	Z12385	H400-02277-11
21	2	Around sealing ring	Z12231	H400-01762-12
20	3	Mechanical face seals	Z10414	H050-01393-03
19	2	Tapered roller bearing TDO	Z11943	H400-01805-05
18	1	parallel key	F4329818	F400-02277-21
17	1	Fixed bearing ring 5	F4329817	F400-02277-20
16	1	Fixed bearing ring 5	F4329816	F400-02277-19
15	1	cover for transport	Z12223	Z400-02277-15
14	1	Plug ø90	F4329814	F400-02277-14
13	2	Torsion bolt	F4329813	F400-02277-13
12	1	Spacer 201	F4329812	F400-02277-12
11	1	Race . seal H-70 A4	F4329811	F400-02277-11
10	1	Bearing cover	F4329810	F400-02277-10
9	1	Spacer 193	F4329809	F400-02277-09
8	1	Bearing cover . closed	F4329808	F400-02277-08
7	1	Spacer 194.5	F4329807	F400-02277-07
6	1	Cover 42	F4329806	F400-02277-06
5	2	Spacer 126.5	F4329805	F400-02277-05
4	2	bearing housing	F4329804	F400-02277-04
3	2	Sprocket ERF 733/317 48x152 7Z 294	F4329803	F400-02277-03
2	1	distance bush	F4329802	F400-02277-02
1	1	drive shaft	F4329801	F400-02277-01
Index	Unit	Description	Order No.	Drawing No. Standard No.

23 DIMENSION SHEET Z400-02277-00



24 THIELE OPERATING AND ASSEMBLY INSTRUCTIONS

The latest version of the Operating and Assembly Instructions can be downloaded as a PDF file from the THIELE homepage.

25 IMPRINT

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