 Řetězárna a.s.[®]	Precise tolerance chains for chain hoists - Grade T	according to EN, ISO, JIS
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OPERATING, FITTING AND MAINTENANCE

1. INTRODUCTION

Welded chains for chain hoists, Grade T (T- DAT- and DT- designs), are noted for their high quality, high utility value and long life. They are manufactured with utmost care and concern for operational safety. These operating and maintenance instructions contain the most important information for users of our chains with precise tolerance for chain hoists. If the chain is a part of another type of chain sling, installation must observe the instructions for the given chain sling.

Safe operation and long life of the hoist chains are subject to compliance with these instructions. All operating personnel as well as personnel responsible for inspections and storage of the chains must be familiar with the instructions.

2. SELECTING A CHAIN FOR A CHAIN HOIST

When selecting a chain for a chain hoist, it is necessary to take into account the hoist construction, the weight of the loads to be lifted, and the environment in which the chain is used. The following recommendations apply to the use of a Grade T hoisting chain:

- T design hand-operated hoists or low-speed motorized hoists working in non-abrasive environments.
- DAT design high-speed motorized hoists with high working capacities, where abrasion resistance is required to increase chain life.
- DT design motorized hoists working in abrasive environments.

Chains with surface hardening (DAT and DT) are not suitable for use in portable hand-operated hoists. For motorized hoists it is necessary to respect the selection criteria according to EN 818-7 Annex B or according to another applicable standard for chain hoists.

2.1. LOAD-BEARING CAPACITY

The maximum load-bearing capacity (Table 2) for which a chain can be used in hoists is defined in the standard EN 818-7 or another applicable standard for chain hoists. When using hoisting chains, it is necessary to respect the respective construction parameters and operating parameters (such as assignment of drives into groups, hoisting speed, lowering speed, number of teeth of the sprocket) and it depends on the hoist manufacturer what load-bearing capacity he will specify.

2.1.1. Usage in adverse temperatures

Hoisting chains can be used without load limitations only within a specific temperature range - see Table 1 for individual chain types.

If the temperature of 200°C is exceeded, the chain must be put out of operation.

If the hoisting chain is to be used in temperatures below the limits specified in Table 1, the use must be consulted with the manufacturer.

Table 1: Temperature limits

Hoisting chain types	Lower temperature limit	Upper temperature limit
T	-40°C	+200°C
DAT	-20°C	+200°C
DT	-10°C	+200°C

2.1.2. Adverse conditions

The hoisting chain must not be used in acidic environments and it must not be subjected to the effects of acid fumes. If there is an acidic environment with fumes, the use must be consulted with the manufacturer. For the same reason, the hoisting chain must not be additionally hot-dip galvanized or otherwise plated without the approval of the manufacturer.

2.2. MANUFACTURER'S CERTIFICATE

With every delivery, the customer receives a test certificate in accordance with the standard ČSN EN 10 204-3.1, containing the following information: manufacturer information, product identification, quantity, dimensions, results of required tests.

Mechanical properties are guaranteed only in the condition in which the chain was supplied to the customer.

2.3. MARKING

Each reel is labelled with the identification of the manufacturer, the thickness of the chain, the number of the production batch, the length of the chain and the number of pieces in the batch. Only chains of an identical length can be included in one reel.

The chains are marked with the manufacturer's mark **R**, the grade mark **T** (DAT, DT), and the code for backtracking, all repeated at least on every 1 m of the chain or at least on every twentieth link of the chain, whichever distance is less.

2.4. STORAGE

Store the hoisting chains in a dry, dustfree place.

3. CHAIN USE

3.1. GENERAL INSTRUCTIONS

Chains must be handled as machine elements. It is especially recommended not to drag chains along the ground, not to subject them to atmospheric effects, not to overload them, and not to perform non-professional repairs on them.

3.2. PERMISSIBLE LOAD (LOAD-BEARING CAPACITY)

Load-bearing capacities specified in the standard (see Table 2) apply for general chain use. If the chain is used as a part of a hoist, the load-bearing capacity must be specified by the manufacturer of the hoist.

The chain must not be overloaded and it must not be subjected to impacts reducing its life.

The load-bearing capacities specified in Table 2 apply to manually operated chain hoists. Load-bearing capacities for motorized chain hoists are specified in standard EN 818-7, Annex B, Table B1, or in other applicable standards for chain hoists.

Table 2: Load-bearing capacities of manually operated chain hoists.

Chain Chain size d x p mm	Load-bearing capacity		
	T design t	DAT design t	DT design t
4 x 12 (12.2)	0.5	0.4	0.25
4.2 x 12.2	0.55	0.44	0.28
5x15 (16)	0.8	0.63	0.4
5.3x15.2	0.9	0.7	0.44
6 x 18 (18.5)	1.1	0.9	0.56
6.3 x 19.1	1.25	1	0.6
7 x 21 (22)	1.5	1.2	0.75
7.1 x 21 (21.2)	1.5	1.2	0.75
7.4x21.2	1.7	1.4	0.9
7.9 x 21.6	2	1.56	1
8 x 24	2	1.6	1
9 x 27	2.5	2	1.25
10 x 30 (28)	3.2	2.5	1.6
11 x 31 (33)	3.8	3	1.9
12 x 36	4.5	3.6	2.2
13 x 39 (36)	5.3	4.2	2.6
14 x 41 (42)	1.1	0.9	0.56
16 x 45 (48)	8	6.3	4
18 x 50 (51; 54)	10	8	5
20 x 60	12.5	10	6.3
22 x 66	15	12.5	7.5

3.3. OPERATING INSTRUCTIONS

Plan well how the load will be tied, lifted, transferred and put down. Before you start lifting, it is necessary to check that the load cannot move freely and cannot slip out of the chain sling, and that there is nothing to prevent it from lifting. A location must be prepared where to set the load down and it must be accessible freely. Keep hands and other body parts away from the stretched chain in order prevent injury.

Operating personnel must always be outside the danger zone. The load must be lifted by gentle pulling without shocks. Also prevent any shocks and jerks during transportation and unloading.

If there is a risk that the chain sling might have been damaged during the handling of a load, it is necessary to stop the operation immediately, set the load down and inspect the whole chain sling thoroughly (see Chapter 4.2).

When handling a load, it is necessary to observe the following rules:

- It is forbidden to use hoisting chains as chains slings.
- It is forbidden to overload hoisting chains.
- Hoisting chains must be led straight along sprockets, without twisting.
- Loads must be fixed properly to prevent them from slipping out.
- Hoisting chains must be protected from shocks and jerks.
- It is forbidden to use hoisting chains when they are deformed or worn-out.

- It is forbidden to use hoisting chains to fix loads by looping or by under-running.

In order to achieve maximum life, hoisting chains must be lubricated, especially in locations where there is mutual contact. Hoisting chains must be kept clean, so that impurities do not obstruct their free movement.

4. INSPECTIONS

4.1. INSPECTION BEFORE FIRST USE

Before using the hoisting chain for the first time, make sure that you have the following:

- test certificate from the manufacturer
- operating instructions and assembly instructions for the integration of the chain in a lifting chain sling
- operating personnel must be trained properly

4.2. STANDARD INSPECTION DURING OPERATION

Regularly inspect the chain integrated in a hoist to reveal apparent damage, such as twisting, bending, elongation of links, etc.

It is recommended to perform a check every day or before every start-up of the hoist.

4.3. INSPECTING THE TECHNICAL CONDITION OF CHAINS

During operation, hoisting chains are exposed to conditions that may affect their reliability and safety. It is therefore necessary to check their technical condition on a regular basis. The frequency of inspections should be determined by the owner according to the parameters of the operation in which the chain is used. Hoisting chains should be inspected by a responsible person at intervals shorter than 12 months. With higher frequency of use, wear, corrosion, heat influence and with a high fault liability, the inspection intervals must be shortened.

The inspection is focused on detecting external defects: deformations, cracks, wear and signs of corrosion. If the chain is used as a part of a hoist, the frequency of professional inspections must be specified by the manufacturer of the hoist.

Before a professional inspection, the chain must be cleaned of oil, dirt and rust. Any cleaning method is permissible as long as it does not damage the original metal.

It is forbidden to burn the chain with open flame, dip it in acid or use a method which could cover any cracks or surface defects.

Then the whole length of the chain is inspected in adequate light. During inspections and professional inspections of link chains it is also necessary to check their marking and to search for any external defects of individual links, such as: change of shape, surface condition, degree of wear, change of link thickness and any cracks.

Faulty chains must be put out of operation.

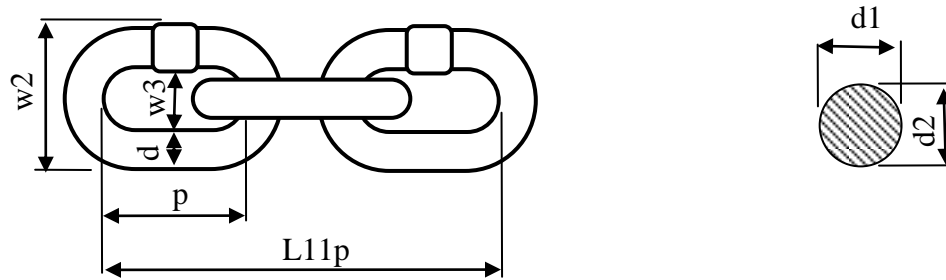
4.4. PUTTING CHAINS OUT OF OPERATION

In manually operated chain hoists, the permissible chain wear in the pitch "**p**" of one link is approx. max. 5 %; the permissible wear across a length of eleven links "**11p**" is max. 3 %.

In motorized chain hoists, the permissible chain wear in the pitch "**p**" of one link is approx. max. 5 %; the permissible wear across a length of eleven links "**11p**" is max. 2 %.

To select the permissible chain wear in the pitch, it is necessary to take into account the limit tolerances, which are selected significantly above or below the nominal pitch value. (This concerns chains with atypical limit tolerances in relation to the nominal pitch, for example chain 7.4x21.2 with a length of $L_{11p}=233.2+1/+1.7$ → the calculation would be based on the value 234.3 mm).

Chains whose the average link thickness d_m decreases as a result of wear in any location by more than 10 % of the nominal thickness " d " (i.e. $d_m = (d_1 + d_2)/2$ is less or equal to $0.9 d$) must be put out of operation. The thickness values " $d_1 + d_2$ " are actually measured values.



A chain must be put out of operation in case of the following defects:

- Chain elongation (as a result of overloading), or insufficient play between the chain links
- Wear of chain links by more than 10% of their original cross-section
- Notches, dents, cracks, deep corrosion, change of colour due to high temperature; shallow and circular dents on surfaces with low tensile stress shall most likely not be defects; deep dents and sharp transversal dents are inadmissible.

4.5. REPAIRS AND MODIFICATIONS OF CHAINS

It is forbidden to repair hoisting chains incorporated into hoists. If a chain link is defective, it is necessary to replace the whole chain segment in the given chain hoist.

5. CHAIN DISPOSAL

Worn and discarded chains are to be disposed of as normal metal waste at a waste collection facility (in accordance with Act no. 125/97 Coll. - waste classification: "O" - Other).