

Notes on the use of JDT mining chains and corresponding connecting elements (chain connectors)

1. General

Mining chains and corresponding connecting elements of J. D. Theile GmbH & Co. KG, D-58239 Schwerte, Germany (JDT), are extended machine elements for machines used in mining for conveying and extraction of raw materials (armoured face conveyor and underground haulage conveyor, coal plough). The specifications of the machine manufacturer / plant builder are to be given top priority. The assembly, installation etc. of chains and chain connectors may be implemented only by employees with sufficient training or competence. Repair and change work on parts supplied by JDT may be carried out only by persons / companies explicitly authorised by JDT.

2. Area of application of different chain types

Conveyor chains may be used only in chain conveyors for the transport of loose rocks (blast rock, broken material, debris, mass) in mining underground and above ground. Conveyor chains are generally used double-stranded in twin inboard chain conveyors or outboard chain conveyor.

Plough chains may be used only for the pulling of the ploughing body during plough-off extraction of coal.

Feed chains may be used only for the advance-feed of the shearer loader during cutting extraction.

3. Technical characteristic values

Provided that nothing different is arranged, the technical characteristic values (dimensions, mechanical properties, technical characteristics) of standard round steel chains correspond to DIN 22252, and of standard flat chains to DIN 22255. Please find information on special chains (F-Class chain, Combi chain, special materials) and/or changed heat treatments in the JDT catalogue "mining chain" or on our homepage at www.jdt.de.

The maximum static loading of the chains (Working Force - *WF*) is 62.5% of the setpoint fracture force. From this results a safety factor used for fracture of $SF=1.6:1$ which should not be reduced.

The instructions of the manufacturers of the machines concerning pre-tensioning of the chain / chain belt, the chain speed, ploughing speed, max. depth of cut, etc. should be followed and should not be exceeded.

Only so much pre-tensioning is to be provided in the system that the hanging chain on the drive does not lead to kinking of the chain and to run-in difficulties in the bottom strand of the conveyor.

4. Flight bars

Conveyor chains should be used with matching flight bars from the system vendor or from JDT. In this way, the function of chain and flight bar in the conveyor is guaranteed. In case of utilisation of other flight bars, the fit accuracy and function must be checked prior to deployment. The distance of the flight bars in the assembled conveyor should not exceed one meter and in particular is to be reduced with a larger fine-grain content. Friction between chain and conveyor base should be avoided (e.g. through design specification of the flight bars or by the employment the JDT F-Class chain).

The screwed connection of the flight bars on the chain is to be implemented with a predetermined tightening torque and checked.

5. Chain pairing

Paired chains are to be used for outboard chain conveyors and twin inboard chain conveyors, where two chain sections of the same length are located next to each other in the conveyor. For this, JDT supplies paired chain sections. These are generally bound up with wire for transport to the application location; the chain ends are additionally marked in colour and possibly (if ordered) numbered sequentially with tags.

6. Chain connection elements

JDT mining chains should be connected with connecting elements (chain connectors) from JDT and closed in an endless loop. Block connecting links may be used running vertically only. The couplings must have the same nominal thickness and the same pitch as the chain links being replaced (important in case of chains with unequal pitch).

For plough chains, connecting elements are to be selected which basically run through and over the chain sprocket on all sides.

With installation of the connectors, new locking pins are to be used. With making the chain into a continuous loop, a chain fixing device is to be used according to the instructions of the plant builder.

7. Chain sprockets

There are chain drive wheels in different designs for the driving of conveyor chains or plough chains on the market. In this case also, the specifications of the system vendors should be considered. Chain sprockets are standardised with the most important function dimensions in DIN 22256.

New chains are basically also to be combined with new chain sprockets.

Worn-out chains combined with new chain sprockets or new chains combined with worn-out chain sprockets can lead to faults, even extending to the failure of the system.

8. Maintenance

In particular in case of frequently changing longwall conditions, a continuous control-check of the pre-tensioning increases the service life of the chain.

The chain section is to be checked for damaged chain elements by regular visual inspections. Here as well, damage through corrosion from the use of the products and their possible effects on the service life are to be analysed exactly.

In case of a pitch wear of >2%, a verification of chain segments is recommended in the laboratory, in order to enable a service life forecast. If the pitch wear is >3%, it should be checked exactly whether further use of the chain is still appropriate, since sudden failures of individual chain segments must then also be included in the calculation, according to loading spectrum.

Table related to the percentage elongation for chains with similar pitch

Chain nominal size	Chain thickness	5xt "new"	Outer length 5 elements "new"	Percentage elongation over 5 links outer length with reference to the smaller dimension				
				1.0%	1.5%	2.0%	2.5%	3.0%
mm	mm	mm	mm	1.0%	1.5%	2.0%	2.5%	3.0%
26 x 92	25.5/26.8	460	511-513.6	516.1	518.7	521.2	523.8	526.3
30 x 108	29.5/30.8	540	599-600.6	605.0	608.0	611.0	614.0	618.0
34 x 126	33.5/34.8	630	697-699.6	704.0	707.5	711.0	714.4	717.9
38 x 126	37.5/38.7	630	705-707.4	712.0	715.6	719.1	722.6	726.2
38 x 137	37.5/38.7	685	760-762.4	767.6	771.4	775.2	779.0	782.8
42 x 146	41.5/42.8	730	813-815.6	821.1	825.2	829.3	833.3	837.4
48 x 152	47.5/49.5	760	855-859	863.6	867.8	872.1	876.4	880.7
56/131x187	56/58	935	1047-1051	1057.5	1062.7	1067.9	1073.2	1078.4

Table related to the percentage elongation for chains with unequal pitch

Chain nominal size	Chain thickness vertical link	5xt "new" 3 vertical links 2 horizontal links	Outer length 5 elements "new"	Percentage elongation over 5 links outer length with reference to the smaller dimension (measured over vertical links)				
				1.0%	1.5%	2.0%	2.5%	3.0%
mm	mm	mm	mm	1.0%	1.5%	2.0%	2.5%	3.0%
42x128/164	32/33.5	712	776-779	783.8	787.6	791.5	795.4	799.3
48x144/160 Type: "CAT" chain	47.5/48.2	752	847-848.4	855.3	859.5	863.7	868.0	872.2
50x146/174 BBC	38/39.5	786	862-865	870.6	874.9	879.2	883.6	887.9
60/135x181/197 FCC	59/60.5	937	1055-1058	1065.6	1070.8	1076.1	1081.4	1086.7

9. Repair

Damaged chain elements are to be replaced immediately with undamaged items. With the use of twin chain belts, it is to be ensured that the pairing of the chain section remains guaranteed through the replacement of individual segments.