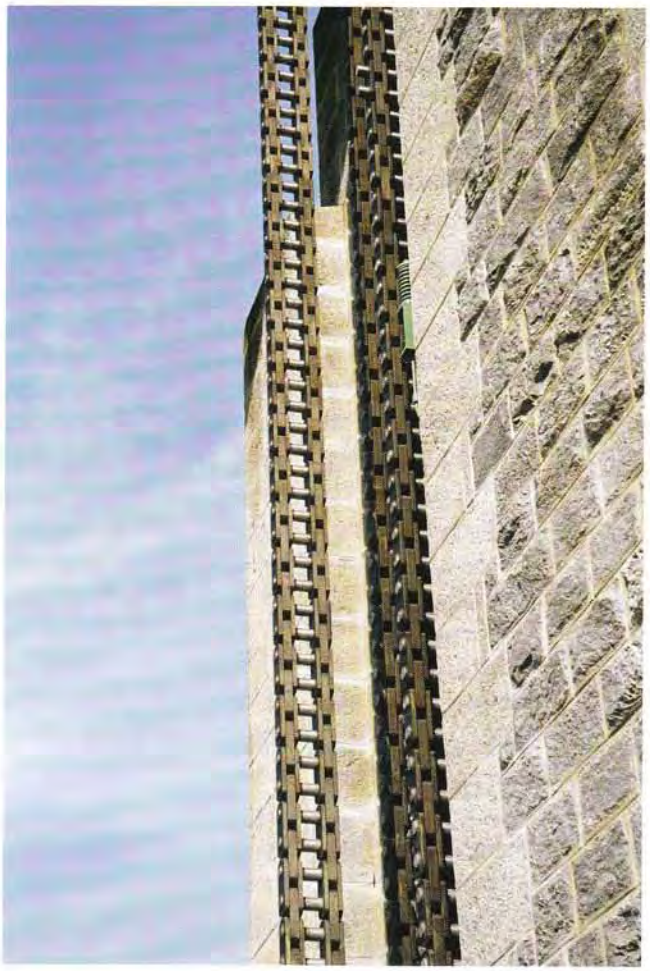
JUNGBLUTH
Förderketten



Specialists for

Conveyor chains and chain wheels

Table of Contents

1 Our Company

Headquarters and production at our location in Bad Hersfeld - certified according to DIN EN ISO 9001:2000

For more than fifty years now, the name Jungbluth Förderketten (conveyor chains) has stood for expertise and quality in the production of chains and chain wheels. Our products are used in the steel, automobile, mining, wood-working and building material industries, in foodstuff production, recycling plants, power stations and in many other fields of application.

Our customers' satisfaction is our highest aim. Providing competent and comprehensive advice to our customers during the preparation and implementation of projects is an essential task for us. Our team of engineers and technicians is always available to give you support in calculating and designing chain drives. We can also advise you on suitable materials and good environmentally-friendly lubricants.

We produce our wide range of conveyor chains and conveyor wheels at our location in Bad Hersfeld, using state-of-the-art machinery and highly qualified staff. All essential steps in the chain production are performed at our company. Our extensive machinery includes CNC machining centres, CNC lathes, presses (up to 400 t), welding robots, our own toolmakers' shop and thermal treatment facilities.

In both the selection of material and the outsourcing of processes (e.g. special thermal processes) we cooperate exclusively with certified, long-standing, reliable partners.

Our certified quality management system and thorough testing after each work step guarantee the high quality of our products.

CNC machining centres in our second plant

2 Our Products

As our product range is mainly focussed on made-to-order chains, your special requirements are our standard lines. Our products are manufactured according to your particulars, but in addition we also develop new optimised drive solutions for your individual applications.

We are able to provide almost all types of conveyor chains currently in demand.

Furthermore we supply conveyor chains according to DIN and ISO standards.

Chain wheels and customised accessories for chain drives round up our range.

Depending on your requirements we can supply your chains in normal, high/low temperature resistant or corrosion resistant steel.

For use in unfavourable conditions we can offer you solutions which reduce chain wear and extend the lifetime of conveyor chains.

Furthermore we supply maintenance-optimised chains for applications where lubrication is very difficult or even impossible, or where the use of lubricants is undesirable for environmental reasons, or because of the sensitivity of the material to be conveyed.

Drawing bench chain
p=200

Double-row hook chain
p=250

Stool chain
p=500

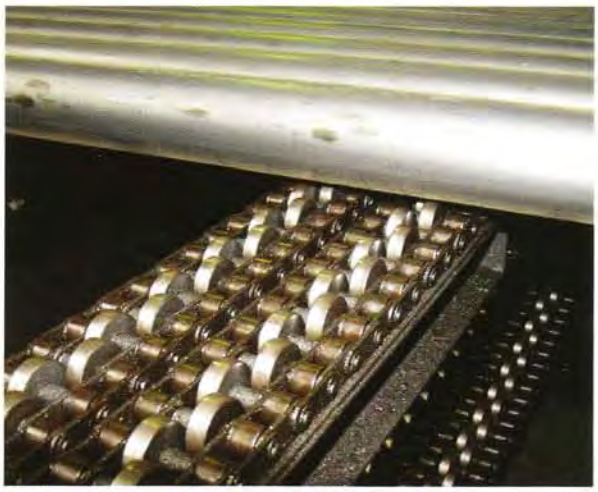
Plate chain
p=450

Bush conveyor chain
with driver dog
p=125

Stopper

Production and Delivery Programme

- Conveyor chains according to DIN 8165 or 8167
- Bush chains according to DIN 8164
- Outboard roller conveyor chains according to DIN 8156 and 8157
- Trough conveyor chains
- Block chains
- Link conveyors
- Fork chains
- Articulated racks
- Coil transport chains
- Plate link chains
- Reversing chains
- Biplanar chains
- Pinions
- Scraper chains
- Apron conveyors
- Steel ladder chains with 3 bearings (liftchains for weir systems)
- Pusher chains for underfloor conveyors
- Drag chains
- Chain wheels, milled and lathed parts, punchings

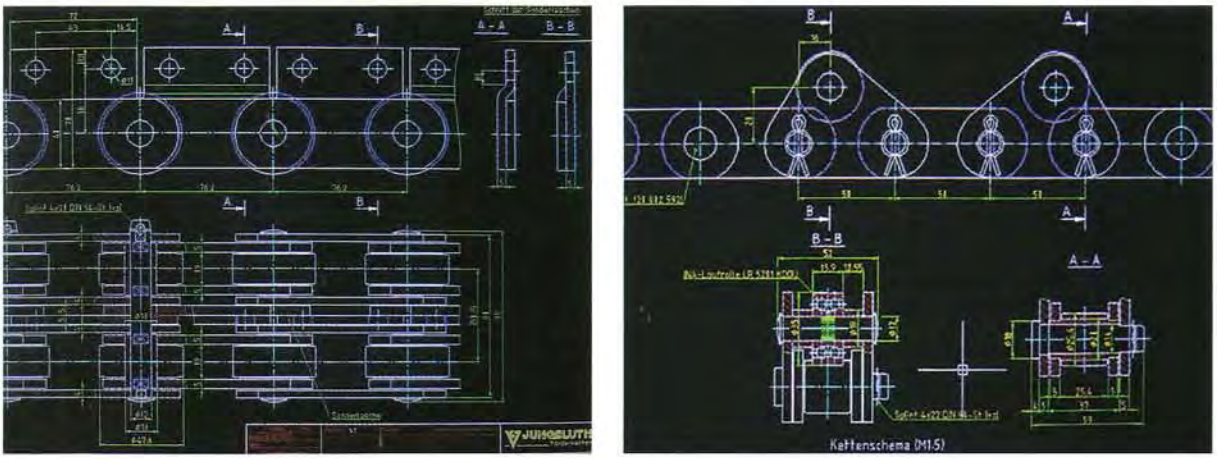


Steel conveying / Accumulation roller chains

3 Our Expertise

Consultation & Engineering

Jungbluth Förderketten is more than just a manufacturer of conveyor chains. We see our role as our customers' expert engineering partner for the field of conveyor chains. We accompany you from the project planning phase, through the production and assembly stages right up to consultations on-site where the chain is in use. On request we can check the condition of existing chains and offer comprehensive technical advice on necessary measures to be taken. We consider this as an indispensable part of the service we offer.



Screenshots of CAD drawings

In order to produce optimal chain drives we rely on a constant dialogue with our customers for the further development and design of our chains. Over the course of the years we have developed comprehensive solutions for a great variety of applications, for example our maintenance-optimised chains which do away with the need for environmentally damaging lubricants and preservatives. These chains do not only serve to protect the environment, but also result in improved cost efficiency. There are neither any costs for lubricants, maintenance work or waste disposal, nor are there risks of fire or conveyor down-times. Our service does not come to an end with the delivery; our engineers and technicians are always on hand to provide support when the conveyor is in operation.

Material Selection and Quality

To ensure that the conveyor chains function properly and achieve a long lifetime it is essential that suitable and high-quality materials are used. The material selection is preceded by the determination of the loads acting on the conveyor chain and by examining the conditions of operation. We have vast experience in the selection of materials, particularly for extreme operation conditions, in corrosive media as well as at high temperatures ranging up to 900° C.

Our company acquires all materials exclusively from long-standing and reliable partners. Furthermore we subject the material to strict quality controls on reaching the company, before it is approved for use in our production.

Precision in Production and Quality Assurance

„Made by Jungbluth" - the very highest quality is guaranteed because we ourselves manufacture the products!

In addition to the selection of the materials, the precise manufacture and careful assembly of the individual parts of the conveyor chain determine its function, wear and lifetime. That is why we insist on carrying out all the main production processes at our company. We only involve outside specialists when we require special thermal processes or surface refinement.

Production of parts at our company

The machining of material on state-of-the-art CNC centres ensures that the even the strictest tolerance requirements are met. This way the essential quality features of a conveyor chain, a high pitch accuracy, exact drive-fit connections and a precise articulation clearance between pins and brushes are guaranteed, resulting in correct functioning, low wear and a long lifetime.

The subsequent assembly of the conveyor chain is carried out by qualified specialists and is subjected (like all previous production processes) to the thorough testing which accompanies our production processes.

Following the Jungbluth conveyor chain development and production system, characterised by a tight pooling of application, design and manufacturing know-how, we provide expertise from the design phase up to on-line operation in your company.

4 The Basics

4.1 Structure of a Conveyor Chain

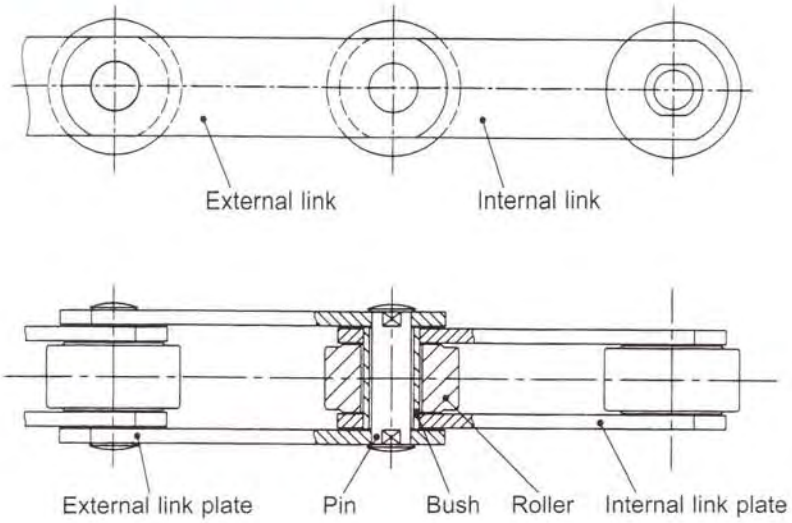


Fig. 1: Structure of a conveyor chain

Link plates	are made of steel according to DIN 17100 or DIN17200 with a minimum tensile strength of 600 N/mm², or of stainless or heat-resisting steel. The surface is strain-hardened by shot-peening to increase the endurance strength. If necessary, a thermal treatment and / or a surface refinement is carried out.
Pins	are made of case hardened steel according to DIN 17210 or of quenched and tempered steel according to DIN 17200 due to being subject to wear, bending and shearing-off. To achieve a high surface hardness and a high toughness of the pin core, the pins are additionally heat-treated, applying the procedures of case hardening, quenching and tempering, and boundary-layer hardening.
Bushes	are subject to wear, bending and surface pressure. As material, mainly case hardened steel is used. Like the pins they are heat-treated to improve their material properties.
Small rollers	are subject to wear and shock. They are made of case hardened or quenched and tempered steel with a corresponding heat treatment.
Large rollers / collar rollers	are subject to high wear. They are made of case hardened steel or of boundary-layer hardenable quenched and tempered steel. Normally, the running surface is hardened. The bearing surface is either hardened, or plain bearings or rolling bearings are used. As plain bearings, especially wear resisting bushes, porous bearings, low-maintenance plain bearings, plastic bushes, etc. can be used. As rolling bearings, mainly deep groove ball bearings, cylindrical roller bearings, or needle roller bearings are used. Plain and rolling bearings are also used if the tensile force of the conveyor chain has to be maintained as low as possible.
Pushing / Fastening links	are chain links to which fastening or pushing elements are bolted or welded on. They are also produced as compact parts. The shape of these elements depends particularly on the type of the material to be conveyed.

If the chain is intended to be used in extraordinary conditions, such as high or low temperatures, water or aggressive media, we select the best suited materials for the construction of the individual parts of the conveyor chain. In the production of our conveyor chains we direct our greatest attention to three important quality features:

• **High pitch accuracy**	to ensure perfect engagement conditions between chain and chain wheel,
• **Exact drive-fit connections**	between pins and link plates, or bushes and link plates, to ensure the resistance against laterally acting forces to be as great as possible,
• **Exact articulation clearance**	adapted to the application, as a prerequisite for low wear and tear and a long lifetime.

4.2 Lubrication of a Conveyor Chain

The links of a conveyor chain are connected with each other by means of pins and bushes (articulation elements). When the chain is guided round the chain wheel, an oscillating movement is produced between pin and bush, leading to energy loss, wear and disturbing noise. These unpleasant side effects, which also have a negative influence on the lifetime, are counteracted by a lubrication adapted to the operational conditions. At the same time the corrosion of the conveyor chain is minimised. The conveyor chains delivered have been provided by the company with a first lubrication and protection against corrosion. It is essential that the user relubricates the chain regulary.

The user should also take into account that the cleaning of the chain depends on the lubrication method. After cleaning you must ensure that there is still sufficient corrosion protection.

Conveyor chains can be constructed in such a way that regreasing can be carried out through lubricating nipples and bore holes. Also automatic lubrication systems are common in transporting plants with conveyor chains. They have the advantage that unexpected dry-running is avoided and an optimal dosage of the lubricant is possible.

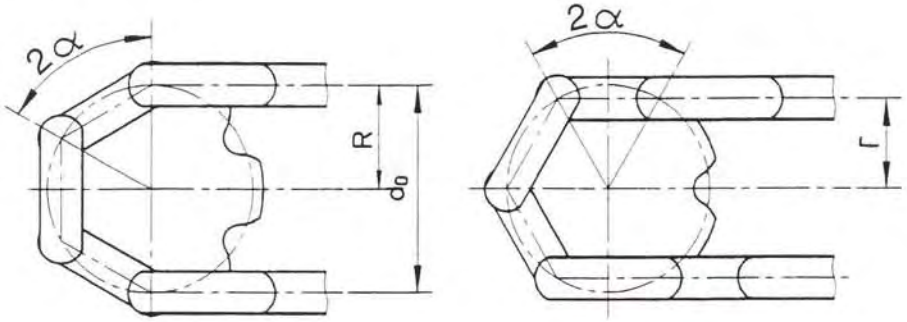
The selection of the chain lubricant depends on the operating conditions of the transporting plant and the requirements of the material to be conveyed. The main features for the selection of a suitable lubricant are:

- Ambient temperature
- Strain on chain conveyor
- Conveying speed
- Aggressiveness and state of aggregation of the surrounding media
- Ability to run after failure of lubricant supply
- Suitability for the intended lubrication method

4.3 Chain Drive Kinematics

4.3.1 Polygon Effect

When the chain is turning round the chain wheel, speed variations are produced due to the fact that the chain does not describe the circuit of the pitch circle, but forms a polygon. It moves towards the centre of the chain wheel causing a chain speed reduction, while rotation remains uniform (polygon effect).



$$V_{max} = \frac{d_0 \cdot \pi \cdot n}{60 \cdot 1000} \left[\frac{m}{s}\right] \qquad V_{min} = \frac{d_0 \cdot \cos\alpha \cdot \pi \cdot n}{60 \cdot 1000} \left[\frac{m}{s}\right]$$

4.3.2 Speed Variations in Dependence on the Number of Teeth

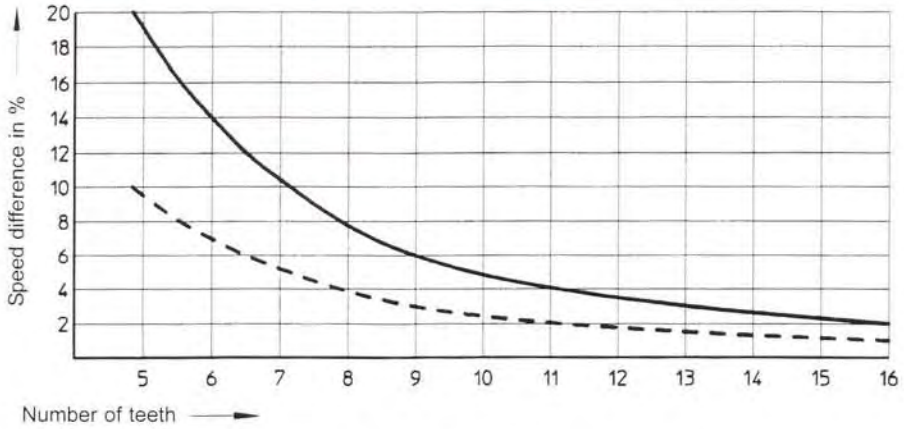


Fig. 3: Speed difference in dependence on the number of teeth

Conveyor chains with rollers running externally allow the chain to be guided on both sides up to the middle of the chain wheel, by which a 50% reduction of the speed difference can be achieved. This means that the run-in speed of the chain link into the chain wheel toothspace is delayed to zero and that the run-in noise is reduced.

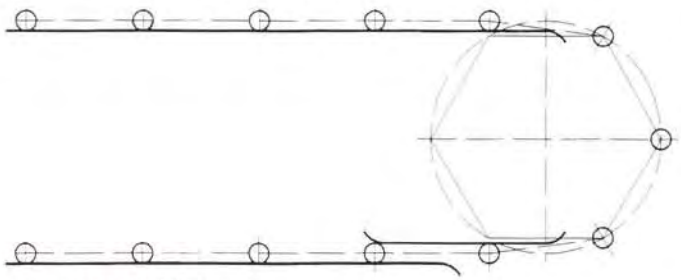


Fig. 4: Measures to reduce the speed difference

4.3.3 Pitch Diameter of the Chain Wheel

$$d_0 = \frac{p}{\sin\left(\frac{180°}{z}\right)} \text{ [mm]} \quad p = \text{pitch} \quad \text{or} \quad d_0 = p \cdot n$$

z	n	z	n	z	n	z	n	z	n	z	n
6	2,0000	16	5,1258	26	8,2962	36	11,4737	46	14,6536	56	17,8347
7	2,3048	17	5,4422	27	8,6138	37	11,7916	47	14,9717	57	18,1529
8	2,6131	18	5,7588	28	8,9314	38	12,1096	48	15,2898	58	18,4710
9	2,9238	19	6,0755	29	9,2491	39	12,4275	49	15,6079	59	18,7892
10	3,2361	20	6,3925	30	9,5668	40	12,7455	50	15,9260	60	19,1073
11	3,5495	21	6,7095	31	9,8845	41	13,0635	51	16,2441	61	19,4255
12	3,8637	22	7,0267	32	10,2023	42	13,3815	52	16,5622	62	19,7437
13	4,1786	23	7,3439	33	10,5201	43	13,6995	53	16,8803	63	20,0618
14	4,4940	24	7,6613	34	10,8380	44	14,0175	54	17,1984	64	20,3800
15	4,8097	25	7,9787	35	11,1558	45	14,3356	55	17,5166	65	20,6982

Tab. 1: Factor n

p / z	40	50	63	80	100	125	160	200	250	315	400
6	80,00	100,00	126,00	160,00	200,00	250,00	320,00	400,00	500,00	630,00	800,00
7	92,19	115,24	145,20	184,38	230,48	288,10	368,76	460,96	576,20	726,01	921,92
8	104,52	130,65	164,62	209,04	261,31	326,63	418,09	522,62	653,27	823,12	1045,24
9	116,95	146,19	184,19	233,90	292,38	365,47	467,80	584,76	730,95	920,99	1169,52
10	129,44	161,80	203,87	258,88	323,61	404,51	517,77	647,22	809,02	1019,37	1294,44
11	141,98	177,47	223,61	283,96	354,95	443,68	567,92	709,90	887,37	1118,09	1419,80
12	154,54	193,18	243,41	309,09	386,37	482,96	618,19	772,74	965,92	1217,06	1545,48
13	167,14	208,93	263,25	334,28	417,86	522,32	668,57	835,72	1044,65	1316,25	1671,44
14	179,76	224,70	283,12	359,52	449,40	561,75	719,04	898,80	1123,50	1415,61	
15	192,38	240,48	303,01	384,77	480,97	601,21	769,55	961,94	1202,42	1515,05	
16	205,03	256,29	322,92	410,06	512,58	640,72	820,12	1025,16	1281,45	1614,62	
17	217,68	272,11	342,85	435,37	544,22	680,27	870,75	1088,44	1360,55	1714,29	
18	230,35	287,94	362,80	460,70	575,88	719,85	921,40	1151,76	1439,70		
19	243,02	303,77	382,75	486,04	607,55	759,43	972,08	1215,10	1518,87		
20	255,70	319,62	402,72	511,40	639,25	799,06	1022,80	1278,50	1598,12		
21	268,38	335,47	422,69	536,76	670,95	838,68	1073,52	1341,90	1677,37		
22	281,06	351,33	442,68	562,13	702,67	878,33	1124,27	1405,34			
23	293,75	367,19	462,66	587,51	734,39	917,98	1175,02	1468,78			
24	306,45	383,06	482,66	612,90	766,13	957,66	1225,80	1532,26			
25	319,14	398,93	502,65	638,29	797,87	997,33	1276,59	1595,74			
26	331,81	414,81	522,66	663,69	829,62	1037,02	1327,39	1659,24			
27	344,55	430,69	542,66	689,10	861,38	1076,72	1378,20	1722,76			
28	357,25	446,57	562,67	714,51	893,14	1116,42	1429,02				
29	369,96	462,54	582,69	739,92	924,91	1156,13	1479,85				
30	382,67	478,34	602,70	765,34	956,68	1195,85	1530,68				

Tab. 2: Pitch diameter d_0

4.3.4 Toothing of Chain Wheels

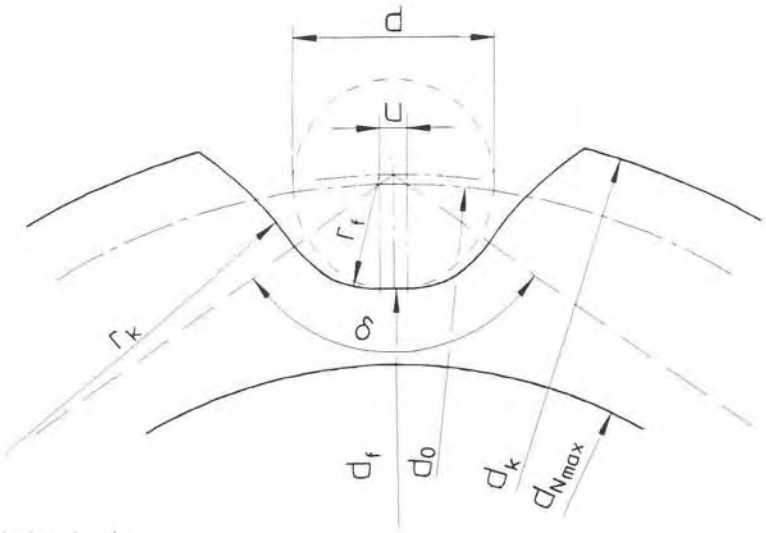


Fig. 5: Toothing of chain wheels

d = Buchsen- oder Rollendurchmesser	siehe Tabellen
d_0 = Teiledurchmesser	$d_0 = \frac{p}{\sin\left(\frac{180°}{z}\right)}$ oder $d_0 = p \cdot n$
d_K = Kopfkreisdurchmesser	$d_K = d_0 + 0{,}25 \cdot d + 10$ für $d \leq 70$ $d_K = d_0 + 0{,}5 \cdot d + 6$ für $d > 70$
d_f = Fußkreisdurchmesser	$d_f = d_0 - d$
p = Teilung g = Laschenbreite	nach Wahl - siehe Tabellen
d_{Nmax} = max. Nebendurchmesser	$d_{Nmax} = d_0 \cdot \cos\left(\frac{180°}{z}\right) - 1{,}2 \cdot g$
u = Zahnlückenspiel	$u = \frac{0{,}2 \cdot d + 0{,}05 \cdot p + 5}{10}$ $u = 0{,}04 \cdot p$ für gegossenes Profil
r_f = Zahnfußradius	$r_f = 0{,}515 \cdot d$ für $d \leq 70$ $r_f = 0{,}51 \cdot d$ für $d > 70$
r_k = Zahnkopfradius	$r_k = 0{,}8 \cdot p - r_f$
δ = Hilfswinkel	$\delta = \left(180° - \frac{360°}{z}\right) - 10$
z = Zähnezahl	$z \geq 6$ nach Wahl

4.3.5 Chain Length L, Distance between Axes a

The chain length L is calculated by multiplying the number of chain links x by the chain pitch p.

$$L = x \cdot p$$

With an equal number of teeth of the chain wheels and the assumed distance a between the axes, the following applies:

$$x = 2 \cdot \frac{a}{p} + z$$

With a different number of teeth of the chain wheels,

$$x = 2 \cdot \frac{a}{p} + \frac{z_1 + z_2}{2} + \left(\frac{z_2 - z_1}{2 \cdot \pi} \right) \cdot \frac{p}{a}$$

applies.

In the case of endless chains, the number of chain links has always to be rounded up, selecting an even number, if possible, in order to avoid offset links.

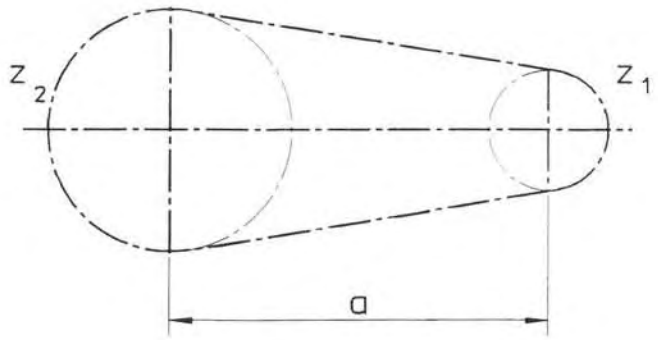


Fig. 6: Distance between axes

The exact distance between axes is calculated as follows:

$$a = \frac{p}{4} \cdot \left[x - \frac{z_1 + z_2}{2} + \sqrt{\left(x - \frac{z_1 + z_2}{2} \right)^2 - 8 \cdot \left(\frac{z_2 - z_1}{2 \cdot \pi} \right)^2} \right]$$

5 The Technical Dimensioning of the Conveyor Chain

5.1 Calculation Parameters

Designation	Symbol	Unit	Designation	Symbol	Unit
Total tensile force of chain	F	N	Filling ratio	φ	----
Circumferential tensile force of chain, total	F_g	N	Coefficient of friction between bush and roller	μ_3	----
Circumferential tensile force of chain, per chain strand	F_i	N	Sagging of slack strand	f	m
Supporting tensile force of chain(depending on sagging)	F_s	N	Coefficient of friction (conveyed material to steel)	μ_4	----
Centrifugal tensile force of chain	F_f	N	Distance of unit load	l_s	m
Pretension force of chain	F_v	N	Coefficient of rolling resistance	μ_2	----
Breaking load of chain	F_b	N	Chain velocity	v	m/s
Number of chain strands	i	----	Coefficient of sliding friction	μ_1	----
Conveying height	H	m	Articulation surface of chain	A_K	cm^2
Conveying length, horizontal	B	m	Slack distance	a_d	m
Distance between axes	a	m	Safety factor	k	----
Angle of inclination of conveyor	α	° (degrees)	Chain length of slack strand	l_d	m
Mass of chain per m of chain	M_K	kg/m	Articulation surface pressure, effective	P_{eff}	N/mm^2
Mass of materials to be conveyed per m of chain	M_F	kg/m	Articulation surface pressure, admissible	P_{zul}	N/mm^2
Conveyor capacity (pieces)	Q_S	St/h	Chain pitch	p	m
Conveyor capacity (mass)	Q_M	t/h	Angular velocity	ω	s^{-1}
Trough width of conveyer	b	m	Number of teeth	z	----
Trough height of conveyor	h	m	Pitch diameter	d_0	m
Cross-sectional area of conveyor	A_M	m^2	Motor output of drive	P	kW
Mass of bulk material to be conveyed	γ	t/m^3	Efficiency of drive	η	----

5.2 Types of Conveyor

The conveyors are subdivided in two main categories:

- Sliding conveyor chains
- Rolling conveyor chains

They are furthermore classified according to the following arrangement criteria:

- Horizontal conveyance
- Oblique conveyance
- Vertical conveyance
- Combined conveyance

5.3 Total Mass of the Material to be conveyed

This is the total mass of the material to be conveyed, which is resting and is to be moved on the conveyor chains or on possibly existing supporting elements (plates, transverse bars, cross-rails, slat bands, etc.).

According to the load distribution on the conveyor chain, a difference is to be made between point, individual and linear loading. If the load is concentrated on a reduced area, the chain pins and rollers have to be recalculated concerning deflexion and pressure, respectively, when dimensioning the conveyor chain.

5.4 Load Carrying Capacity of the Rollers

The load carrying capacity of the rollers depends on the roller material, the type of bearing, the chain velocity, the temperature, and the lubrication. For surface-hardened steel rollers, with a low chain velocity (< 0,25m/s) and a sufficient surface pressure, up to 800 N/cm² are admissible.

If rollers are made of quenched and tempered or of unhardened steel, of grey cast iron or of synthetic material, lower bearing contact pressures are admissible (compare the following tables).

Advantages of synthetic rollers are:

- No maintenance
- Lightweight construction
- Silent run
- High chemical resistance

It is furthermore possible to improve the sliding properties of the rollers by means of bearing bushes. A suitable bearing material is lead tin bronze (surface pressures up to 300 N/cm²), but also special bearing materials are appropriate for a low-maintenance operation.

The following tables 3a and b show admissible roller loads for conveyor chains according to DIN 8165 and DIN 8167, which have to be multiplied by the corresponding correction factors from tables 4 to 8, using the formulae indicated:

$$\text{Admissible load of the roller} = \text{table value} \cdot f_1 \cdot f_2 \cdot f_3 \cdot f_4 \cdot f_5$$

Chain according to DIN 8165	Mating of material Bush / Roller C15E / C15E C15E / 9SMn28E
FVT 40	2000
FVT 63	3000
FVT 90	3800
FVT 112	5100
FVT 140	7050
FVT 180	10550
FVT 250	15550
FVT 315	21500
FVT 400	23900
FVT 500	31200
FVT 630	39400

Chain according to DIN 8167	Mating of material Bush / Roller C15E / C15E C15E / 9SMn28E
MT 20	1050
MT 28	1350
MT 40	1900
MT 56	2750
MT 80	3850
MT 112	5200
MT 160	7200
MT 224	10050
MT 315	13500
MT 450	18450
MT 630	26000
MT 900	36450

Tab. 3: Loadability of rollers (N/Roller) for carrying roller chains according to DIN 8165 and DIN 8167

Roller type	f_1
Roller	1,0
Flanged roller	0,9

Tab. 4: Factor f_1 : Roller type

Roller material (bush of case-hardened steel, hardened)	f_2
Case-hardened steel, hardened	1,00
Stainless steel, hardened	0,60
Stainless steel, unhardened	0,30
Standard steel, unhardened	0,20
Grey cast iron	0,12

Tab 5: Factor f_2 : Roller material

Lubricating conditions	f_3
Sufficient lubrication, no dirt or rough operating conditions	1,0
Insufficient lubrication, no dirt or rough operating conditions	0,4 - 0,6
Without lubrication, with much dirt and rough operating conditions	0,2 - 0,35

Tab. 6: Factor f_3 : Lubrication

Chain velocity in m/s	f_4
0,10	1,15
0,25	1,00
0,50	0,85
1,00	0,50

Tab. 7: Factor f_4 : Chain velocity

Temperature in °C	f_5
20 - 200	1,00
200 - 260	0,50
260 - 285	0,25
285 - 300	0,15

Tab 8: Factor f_5 : Temperature

Mating of material		Max. specific bearing contact pressure in N/cm²
Roller	Bush	
Case-hardened steel, hardened	Case-hardened steel, hardened	800
Quenched and tempered steel	" "	300
Unhardened steel	" "	160
Grey cast iron	" "	100
Bronze	" "	300
Polyamide 6	" "	50

Tab. 9: Admissible maximum values of specific pressing

5.5 Coefficients of Friction

5.5.1 Sliding Friction of Chains on a Base in Continuous Operation

Material of slide rail	μ_1 Insufficient lubrication	μ_1 Good lubrication
Steel	0,35	0,25
Synthetic material	0,20	0,15
Hardwood	0,30	0,25

Tab. 10: Coefficient of sliding friction μ_1

5.5.2 Rolling Friction of Chains on Steel Guides

$$\text{Coefficient of rolling resistance } \mu_2 = \frac{2 \cdot c + \mu_3 \cdot d_3}{d_5} \qquad \mu_2 = 0{,}08...\underline{0{,}12}...0{,}18$$

d_3 = bush diameter [mm]
d_5 = roller diameter [mm]
c = experimental coefficient,
depending on material and the surface roughness of the areas of contact

Conditions of guide c
0,5 Steel roller on steel guide with smooth surface
0,6 Mean value
1,0 Steel roller on steel guide with rough surface

Tab. 11: Coefficient c in dependence on material and contact surface

Mating of material Roller / bush	μ_3 Insufficient lubrication	μ_3 Good lubrication
Steel roller on steel bush	0,30	0,20
Roller with bronze bush on steel bush	-	0,15
PA6 roller on steel bush	0,15	0,10
Roller with rolling bearing on steel bush	0,03	0,015 ... 0,005

Tab. 12: Coefficient of friction between roller and bush μ_3

5.5.3 Coefficient of Friction between Material to be conveyed and Steel μ_4, Bulk Weight γ and Filling Ratio φ

Type of material to be conveyed	Coefficient of friction μ_4	Bulk weight γ in t/m³	Filling ratio φ
Ash	0,85	0,50	0,70
Ore	1,20	2,25	0,60
Cereals	0,50	0,65	0,80
Wood chips	0,80	0,25	0,75
Gravel	1,00	1,75	0,65
Coal	0,90	0,80	0,50
Coke	1,00	0,45	0,60
Loam	0,75	1,25	0,70
Flour	0,50	0,60	0,70
Sand	0,80	1,55	0,60
Broken stone	0,65	1,80	0,65
Peat	0,70	0,40	0,80
Cement	0,65	1,20	0,70

Tab. 13: Coefficient of friction - material to be conveyed / steel, bulk weight and filling ratio

5.6 Calculation of the Total Tensile Force of Chain F

The total tensile force of a chain F results from the sum of the total circumferential tensile force F_g, the supporting tensile force of chain F_s, and the centrifugal tensile force of chain F_f.

$$F = F_g + F_s + F_f$$

5.6.1 Chain Supporting Tensile Force F_s

The supporting tensile force of the chain is produced when the chain is freely sagging and depends on the dead weight of the chain and the chain length of the sagging slack strand.

$$F_s = \frac{M_K \cdot 9{,}81 \cdot a_d^{\,2}}{8 \cdot f} \cdot \sqrt{1 + 16 \cdot \frac{f^2}{a_d^{\,2}}}$$

Sag f results from the following equation:

$$f = \sqrt{0{,}375 \cdot a_d \cdot (l_d - a_d)} \qquad (f \text{ selected should be} \approx 10\% \text{ of } a_d)$$

5.6.2 Chain Centrifugal Tensile Force F_f

The centrifugal tensile force of the chain is a tensile force depending on the chain velocity v and the chain wheel diameter, which, as a component of the total tensile force of the chain, is to be considered above all in the case of higher chain velocities.

$$F_f = M_K \cdot v^2$$

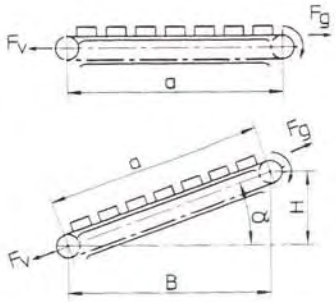
where $v = \omega \cdot \frac{d_0}{2}$; $\omega = 2 \cdot p \cdot n$ (n = number of revolutions of the chain wheel in s^{-1})

5.6.3 Chain Circumferential Tensile Force F_g

The circumferential tensile force (effective power) results from the operating load dependent torque of the chain drive to be transmitted. In the following you will find some formulae for the calculation of the total circumferential tensile force F_g in dependence of the conveyor type. If the conveyor includes various chain strands, the chain circumferential tensile force per strand F_i results from the relation:

$$F_i = \frac{F_g}{i}$$

Sliding Friction



$$F_g = 1{,}1 \cdot a \cdot \mu_1 \cdot 9{,}81 \cdot (2 \cdot M_K + M_F) \qquad Q_S = \frac{3600 \cdot v}{l_s}$$

$$F_v = 2{,}2 \cdot (F_s + a \cdot \mu_1 \cdot 9{,}81 \cdot M_K)$$

$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot [(M_K + M_F) \cdot (\mu_1 \cdot \cos\alpha + \sin\alpha) + M_K \cdot (\mu_1 \cdot \cos\alpha - \sin\alpha)]$$

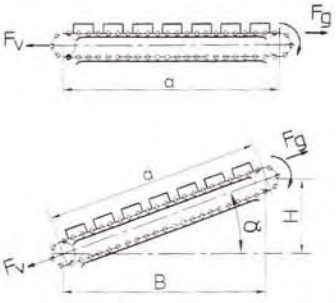
if $(\mu_1 \cdot \cos\alpha - \sin\alpha) < 0$:

$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot (M_K + M_F) \cdot (\mu_1 \cdot \cos\alpha + \sin\alpha)$$

$$F_v = 2{,}2 \cdot F_s \quad \ldots \quad \text{if} \quad H/B > \mu_1$$

$$F_v = 2{,}2 \cdot [F_s + 9{,}81 \cdot M_K \cdot (B \cdot \mu_1 - H)] \quad \ldots \quad \text{if} \quad H/B < \mu_1$$

Rolling Friction



$$F_g = 1{,}1 \cdot a \cdot \mu_2 \cdot 9{,}81 \cdot (2 \cdot M_K + M_F) \qquad Q_S = \frac{3600 \cdot v}{l_s}$$

$$F_v = 2{,}2 \cdot (F_s + a \cdot \mu_2 \cdot 9{,}81 \cdot M_K)$$

$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot [(M_K + M_F) \cdot (\mu_2 \cdot \cos\alpha + \sin\alpha) + M_K \cdot (\mu_2 \cdot \cos\alpha - \sin\alpha)]$$

if $(\mu_2 \cdot \cos\alpha - \sin\alpha) < 0$:

$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot (M_K + M_F) \cdot (\mu_2 \cdot \cos\alpha + \sin\alpha)$$

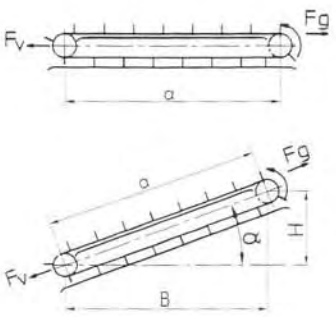
$$F_v = 2{,}2 \cdot F_s \quad \ldots \quad \text{if} \quad H/B > \mu_2$$

$$F_v = 2{,}2 \cdot [F_s + 9{,}81 \cdot M_K \cdot (B \cdot \mu_2 - H)] \quad \ldots \quad \text{if} \quad H/B < \mu_2$$

Trough Chain Conveyor

$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot \left(2 \cdot M_K \cdot \mu_1 + \frac{Q_M}{3{,}6 \cdot v} \cdot \mu_4 \right)$$

$$F_v = 2{,}2 \cdot (F_s + a \cdot \mu_1 \cdot 9{,}81 \cdot M_K)$$



$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot \left[\begin{array}{l} M_K \cdot (\mu_1 \cdot \cos\alpha + \sin\alpha) + \dfrac{Q_M}{3{,}6 \cdot v} \cdot (\mu_4 \cdot \cos\alpha + \sin\alpha) + \\ M_K \cdot (\mu_2 \cdot \cos\alpha - \sin\alpha) \end{array} \right]$$

if $(\mu_1 \cdot \cos\alpha - \sin\alpha) < 0$:

$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot \left[M_K \cdot (\mu_1 \cdot \cos\alpha + \sin\alpha) + \frac{Q_M}{3{,}6 \cdot v} \cdot (\mu_4 \cdot \cos\alpha + \sin\alpha) \right]$$

$$F_v = 2{,}2 \cdot F_s \quad \ldots \quad \text{if} \quad H/B > \mu_1$$

$$F_v = 2{,}2 \cdot [F_s + 9{,}81 \cdot M_K \cdot (B \cdot \mu_1 - H)] \quad \ldots \quad \text{if} \quad H/B < \mu_1$$

5.7 Calculation of the Chain Breaking Load F_b required

$$F_b = k \cdot F_i$$

Safety factor k k = 5 ... 7 ... 12

The safety factor k depends mainly on the operational conditions and the number of teeth of the chain wheel. Generally, k is about 6 to 7.

5.8 Calculation of the Driving Power P

$$P = \frac{F \cdot v}{1000 \cdot \eta} \quad ; \quad \text{where } \eta = 0{,}75 \ldots 0{,}8 \ldots 0{,}9$$

5.9 Calculation of the Articulation Surface Pressure P_{eff}

$$P_{eff} = \frac{F}{A_K}$$

Diagram for P_{zul}

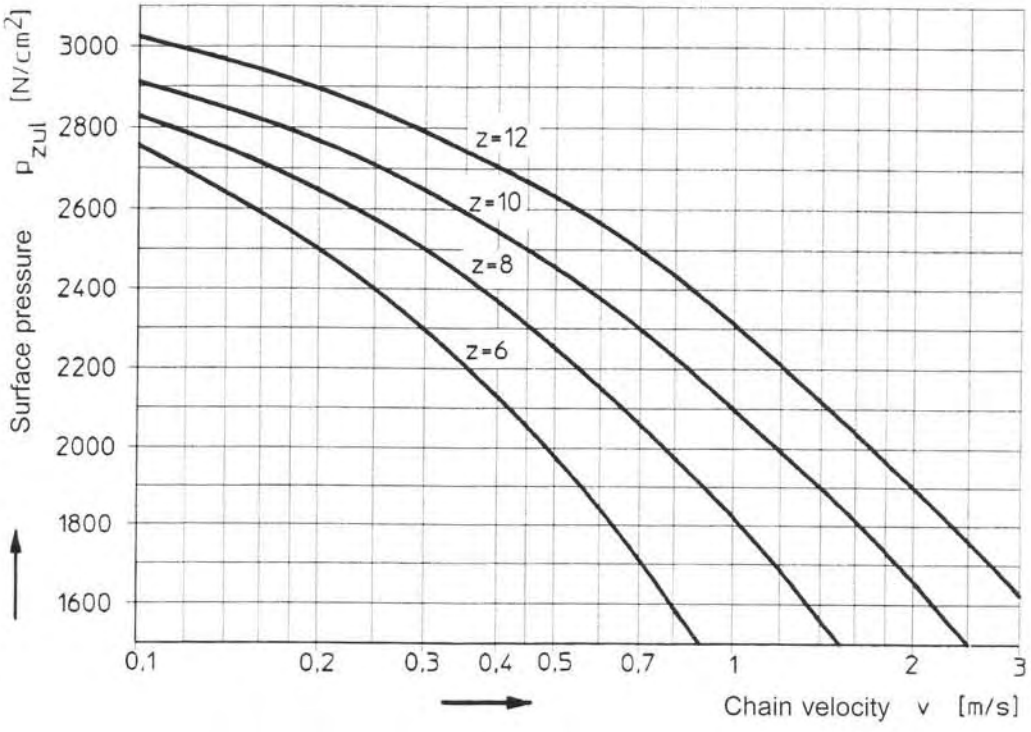


Fig. 7: Articulation surface pressure

5.10 Examples of Calculation

Example 1: Trough conveyor, horizontal

Material to be conveyed	:	Wood chips
Conveying length	:	40 m
Conveyor capacity	:	25 t/h
Trough width of conveyor	:	400 mm
Trough height of conveyor	:	300 mm
Number of chain strands	:	1
Number of teeth of chain wheel	:	8

a) Calculation of the chain velocity

$$Q_M = 3600 \cdot v \cdot A_M \cdot \gamma$$

$$v = \frac{Q_M}{3600 \cdot A_M \cdot \gamma}$$

$$A_M = b \cdot h \cdot \varphi$$

$$A_M = 0{,}4 \cdot 0{,}3 \cdot 0{,}75$$

$$A_M = 0{,}09 \ m^2$$

$$Q_M = 25 \ {}^{t}/_{h}$$

$\gamma = 0{,}25$ (see section 4.5.3)

$\varphi = 0{,}75$ (see section 4.5.3)

$b = 0{,}4$ m

$h = 0{,}3$ m

$$v = \frac{25}{3600 \cdot 0{,}09 \cdot 0{,}25} = \underline{\underline{0{,}31 \ {}^{m}/_{s}}}$$

b) Calculation of the chain tensile force

$$F_g = 1{,}1 \cdot a \cdot 9{,}81 \cdot \left(2 \cdot M_K \cdot \mu_1 + \frac{Q_M}{3{,}6 \cdot v} \cdot \mu_4 \right)$$

$$F_g = 1{,}1 \cdot 40 \cdot 9{,}81 \cdot \left(2 \cdot 8 \cdot 0{,}35 + \frac{25}{3{,}6 \cdot 0{,}31} \cdot 0{,}8 \right)$$

$$F_g = \underline{\underline{10150 \ N}}$$

$a = 40$ m

$M_K = 8 \ {}^{kg}/_{m}$

$\mu_1 = 0{,}35$ (see section 4.5.1)

$\mu_4 = 0{,}8$ (see section 4.5.3)

$i = 1$

$k = 7$

$$F_i = \frac{F_g}{i} = \frac{10150}{1} = F \quad (F_s \text{ and } F_f \text{ negligible})$$

$$F_b = k \cdot F = 7 \cdot 10150 = \underline{\underline{71050 \ N}}$$

⇒ 1. assumption: Selection of the trough conveyor chain TF 90 according to table on page 50
Standard pitch: p = 125 mm

c) Recalculation of chain considering articulation surface pressure

$$P_{eff} = \frac{F}{A_K} \leq P_{zul}$$

$$P_{eff} = \frac{10150}{5} = \underline{\underline{2030 \ {}^{N}/_{cm^2}}} < 2500 \ {}^{N}/_{cm^2}$$

$F = 10150$ N

$A_K = 5 \ cm^2$ (see table on page 50)

$P_{zul} = 2500 \ {}^{N}/_{cm^2}$ (see section 4.9)

Chain size TF90 selected correctly!

Example 1: Trough conveyor, horizontal - continuation

d) Calculation of chain pretensioning force

$$F_v = 2{,}2 \cdot (F_s + a \cdot \mu_1 \cdot 9{,}81 \cdot M_K)$$

$$F_v = 2{,}2 \cdot (0 + 40 \cdot 0{,}35 \cdot 9{,}81 \cdot 8)$$

$$F_v = \underline{\underline{2420 \text{ N}}}$$

$F_s = 0$ (as slack strand is supported)

$a = 40$ m

$M_K = 8 \text{ kg/m}$

$\mu_1 = 0{,}35$ (see section 4.5.1)

e) Driving power required

$$P = \frac{F \cdot v}{1000 \cdot \eta}$$

$$P = \frac{10150 \cdot 0{,}31}{1000 \cdot 0{,}8} = \underline{\underline{3{,}9 \text{ kW}}}$$

$F = 10150$ N

$v = 0{,}31 \text{ m/s}$

$\eta = 0{,}8$

Example 2: Conveyance of pallets

Material to be conveyed	:	Pallets
Conveying length	:	30 m
Pallet size	:	Length: 1200 mm, width: 800 mm
Total mass per pallet	:	600 kg
Number of chain strands	:	2
Chain velocity	:	0,2 m/s
Number of teeth of chain wheel	:	10
Max. number of pallets	:	20
Chain type selected	:	Carrying roller chain according to DIN 8165

a) Calculation of the chain tensile force

$$F_g = 1{,}1 \cdot a \cdot \mu_2 \cdot 9{,}81 \cdot (2 \cdot M_K + M_F)$$

$$F_g = 1{,}1 \cdot 30 \cdot 0{,}12 \cdot 9{,}81 \cdot (2 \cdot 11 + 400)$$

$$F_g = \underline{\underline{16400 \text{ N}}}$$

$$F_i = \frac{F_g}{i} = \frac{16400}{2} = \underline{\underline{8200 \text{ N}}}$$

$$F_b = k \cdot F_i$$

$$F_b = 7 \cdot 8200 = \underline{\underline{57400 \text{ N}}}$$

$a = 30$ m

$\mu_2 = 0{,}12$ (estimated, see section 4.5.2)

$$M_K = 2 \cdot 5{,}5 \text{ kg/m} = \underline{\underline{11 \text{ kg/m}}}$$

$$M_F = \frac{20 \text{ St} \cdot 600 \text{ kg/piece}}{30 \text{ m}}$$

$$M_F = \underline{\underline{400 \text{ kg/m}}}$$

$k = 7$

⇒ Selection of the chain type FVT 63, with a minimum breaking load of 63 kN (see table on page 44)

Example 2: Conveyance of pallets - continuation

b) Recalculation of chain considering articulation surface pressure

$$P_{eff} = \frac{F_i}{A_K} \leq P_{zul}$$

$F_i = 8200$ N

$A_K = 3{,}7\ cm^2$ (see tables on pages 44 and 45)

$P_{zul} = 2780\ {}^{N}/_{cm^2}$ (see section 4.9)

$$P_{eff} = \frac{8200}{3{,}7} = \underline{\underline{2220\ {}^{N}/_{cm^2}}} \leq 2780\ {}^{N}/_{cm^2}$$

c) Recalculation of roller load

Number of carrying rollers : 4
Chain pitch : 100 mm
Pallet mass : 600 kg

Existing roller load $= \frac{600 \cdot 9{,}81}{4} = \underline{\underline{1472\ {}^{N}/_{roller}}} \approx \underline{\underline{1500\ {}^{N}/_{roller}}}$

Admissible roller load : see section 4.4

Carrying roller chain FVT 63 : $3000\ {}^{N}/_{roller} \cdot f_1 \cdot f_2 \cdot f_3 \cdot f_4 \cdot f_5$

- Roller	f_1 : 1,0
- Case-hardened steel, hardened	f_2 : 1,0
- Insufficient lubrication, no dirt or rough operating conditions	f_3 : 0,4...0,6
- Chain velocity = 0,2 m/s	f_4 : 1,0
- Ambient temperature 10 - 25 °C	f_5 : 1,0

⇒ Admissible roller load = $3000\ {}^{N}/_{roller} \cdot 1{,}0 \cdot 1{,}0 \cdot 0{,}4 \cdot 1{,}0 \cdot 1{,}0 = \underline{\underline{1200\ {}^{N}/_{roller}}}$

⇒ Existing roller load = $1500\ {}^{N}/_{roller} > \underline{\underline{1200\ {}^{N}/_{roller}}}$

In dependence of the chain lubrication (factor f3), the admissible roller load may be exceeded. It is therefore more reasonable to select the next chain in size. ⇒ FVT 90

d) Driving power required

$$P = \frac{F_g \cdot v}{1000 \cdot \eta}$$

$$P = \frac{16400 \cdot 0{,}2}{1000 \cdot 0{,}8} = \underline{\underline{4{,}1\ kW}}$$

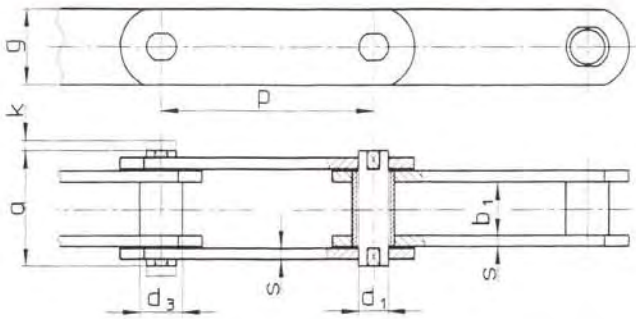
$F_g = 16400$ N

$v = 0{,}2\ {}^{m}/_{s}$

$\eta = 0{,}8$

6.1 Conveyor Chains, DIN 8165

Conveyor chains with solid pins — Type FV — DIN 8165 part 1 — Sheet 1/2
Single-strand chains



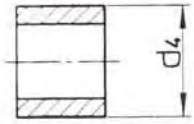
DIN number of chain		Pitch p	Inside width b_1	Pins ø d_1	Bushes ø d_3	Small rollers ø d_4	Rollers ø d_5	Flanged rollers ø d_6/d_7	Link plate width g	Link plate thickness s
						mm				
FV	40	40 63 100	18	10	15	20	32	40/48	26	3
FV	63	63 100 125 160	22	12	18	26	40	50/60	30	4
FV	90	63 100 125 160 200 250	25	14	20	30	48	63/73	35	5
FV	112	100 125 160 200 250	30	16	22	32	55	72/87	40	6
FV	140	100 125 160 200 250 315	35	18	26	36	60	80/95	45	6
FV	180	125 160 200 250 315 400	45	20	30	42	70	100/120	50	8
FV	250	125 160 200 250 315 400	55	26	36	50	80	125/145	60	8
FV	315	160 200 250 315 400	65	30	42	60	90	140/170	70	10
FV	400	160 200 250 315 400	70	32	44	60	100	150/185	70	12
FV	500	160 200 250 315 400 500	80	36	50	70	110	160/195	80	12
FV	630	200 250 315 400 500	90	42	56	80	120	170/210	100	12

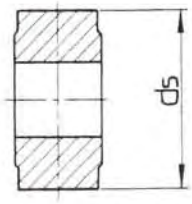
Conveyor chains with solid pins
Single-strand chains

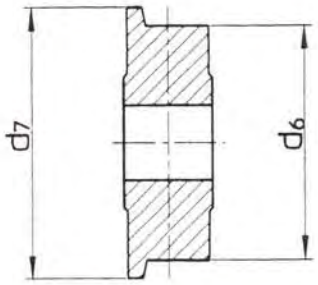
Type FV

DIN 8165 part 1

Sheet 2/2

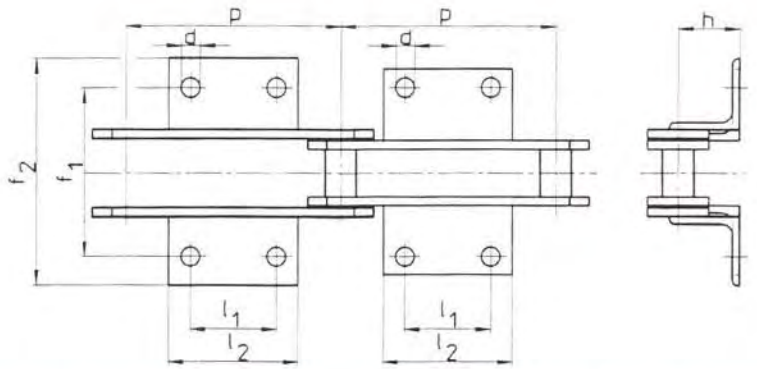






DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight of chain			
						without roller	with small roller	with large roller	with flanged roller
	mm		kN	cm²	N/cm²	kg/m			
FV 40	37	3,5	40	2,5	2680	2,70 2,16 1,82	3,13 2,43 1,99	4,71 3,44 2,62	- 4,62 3,37
FV 63	46	4,5	63	3,7	2840	3,52 2,91 2,71 2,53	4,21 3,35 3,06 2,80	6,04 4,50 3,98 3,52	8,35 5,96 5,14 4,43
FV 90	53	4,5	90	5,0	3000	5,28 4,34 4,03 3,75 3,55 3,39	6,42 5,06 4,60 4,19 3,90 3,67	9,61 7,07 6,21 5,45 4,91 4,48	- 9,87 8,44 7,20 6,31 5,59
FV 112	63	4,5	112	6,8	2750	6,17 5,69 5,27 4,97 4,73	7,11 6,44 5,86 5,44 5,10	10,60 9,23 8,04 7,18 6,50	15,28 12,98 10,96 9,53 8,37
FV 140	68	6,0	140	8,6	2720	7,61 6,94 6,35 5,92 5,59 5,31	8,87 7,94 7,13 6,55 6,09 5,71	13,50 11,65 10,03 8,87 7,95 7,18	20,16 16,97 14,19 12,20 10,61 9,29
FV 180	86	7,0	180	12,3	2440	10,78 9,80 9,09 8,53 8,07 7,69	12,61 11,23 10,24 9,45 8,79 8,26	19,18 16,36 14,34 12,73 11,40 10,31	31,44 25,94 22,01 18,86 16,27 14,14
FV 250	98	8,0	250	18,7	2230	14,78 13,19 12,06 11,16 10,41 9,80	17,92 15,65 14,03 12,73 11,66 10,78	27,75 23,33 20,17 17,65 15,56 13,85	- 43,09 35,98 30,29 25,60 21,76
FV 315	117	8,0	315	25,8	2040	20,38 18,50 17,00 15,76 14,75	24,84 22,07 19,85 18,02 16,53	35,44 30,55 26,64 23,41 20,77	- 55,02 46,21 38,94 33,00
FV 400	131	10,0	400	30,7	2170	24,27 22,05 20,28 18,81 17,62	28,62 25,53 23,06 21,02 19,36	44,46 38,21 33,20 29,07 25,70	- 67,95 57,00 47,96 40,57
FV 500	141	10,0	500	38,2	2180	30,40 27,34 24,88 22,86 21,20 19,98	37,61 33,11 29,50 26,52 24,09 22,29	57,75 49,21 42,38 36,75 32,14 28,73	- 85,71 71,59 59,92 50,39 43,33
FV 630	153	10,0	630	48,7	2160	36,96 33,34 30,34 27,90 26,09	45,82 40,42 35,97 32,33 29,63	66,24 56,76 48,93 42,54 37,80	- 92,74 77,49 65,03 55,79

Fixing Brackets for conveyor chains | Type FV | DIN 8165 part 2 | Sheet 1/1



DIN number of chain	Pitch p	Length of bracket l_2	Hole pitch l_1	Hole ø d	Distance between hole centres f_1	Overall width of chain f_2 (max)	Height above chain centre h	Bracket DIN 1028
				mm				
FV 40	63 100	31 50	- 30	6,6	50	100	20	25x25x3
FV 63	63 100 125 160	40 50 60 70	- 30 40 50	9,0	68	110	30	30x30x3
FV 90	100 125 160 200 250	50 60 70 80 85	30 40 50 60 65	9,0	80	130	35	40x40x4
FV 112	100 125 160 200 250	50 65 75 90 105	30 40 50 65 80	11,0	100	140	40	40x40x5
FV 140	100 125 160 200 250 315	55 65 75 90 105 125	30 40 50 65 80 100	11,0	100	170	45	50x50x5
FV 180	125 160 200 250 315 400	65 80 95 110 130 130	35 50 65 80 100 100	13,5	128	190	45	50x50x6
FV 250	125 160 200 250 315 400	50 80 95 110 130 130	- 50 65 80 100 100	13,5	138	230	55	65x65x7
FV 315	160 200 250 315 400	50 95 110 130 130	- 65 80 100 100	13,5	170	260	60	70x70x9
FV 400	160 200 250 315 400	50 100 120 140 140	- 60 80 100 100	17,5	190	290	65	80x80x10
FV 500	160 200 250 315 400 500	50 90 120 140 140 140	- 50 80 100 100 100	17,5	200	300	70	80x80x10
FV 630	200 250 315 400 500	50 110 140 140 140	- 70 100 100 100	17,5	230	350	80	100x100x10

Rollers for conveyor chains DIN 8165 DIN 8166 Sheet 1/1

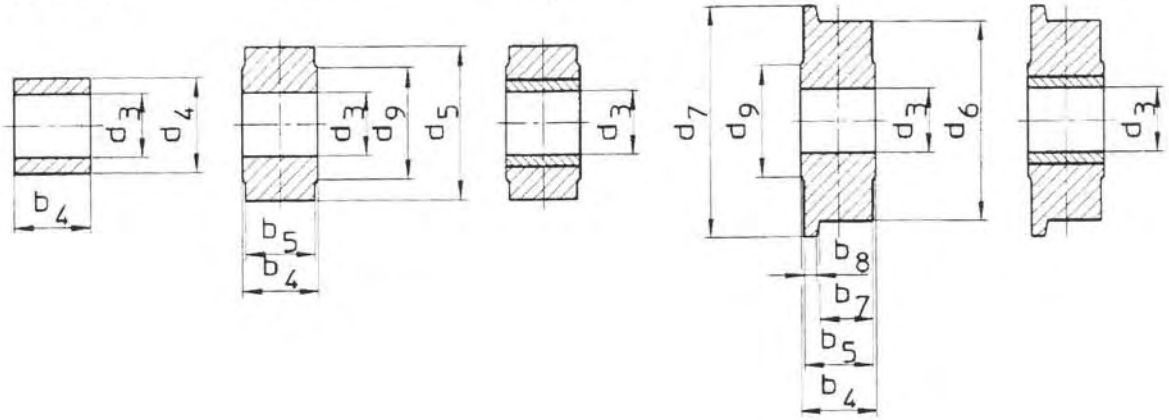
Small rollers
Shape A

Large rollers
Shape B

Shape C

Flanged rollers
Shape D

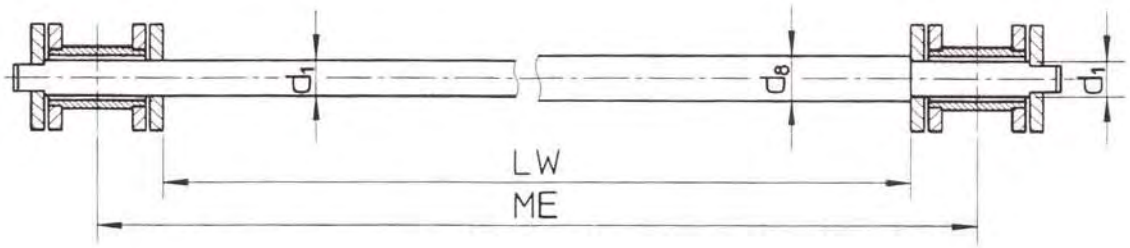
Shape E



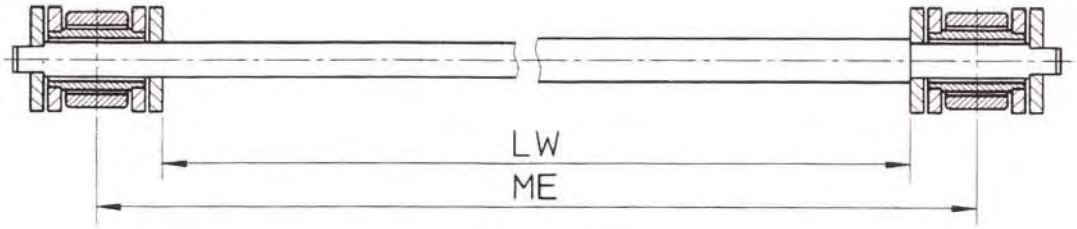
DIN number of chain	Width				Diameter						Weight	
	b_4 max.	b_5 max.	b_7 max.	b_8 max.	d_3 max.	d_4 max.	d_5 max.	d_6 max.	d_7 max.	d_9 =	Roller	Flanged roller
	mm										kg	
FV 40	17	16	12,0	3,0	15,1	20	32	40	48	26	0,081	0,167
FV 63	21	20	15,0	4,0	18,1	26	40	50	60	30	0,160	0,322
FV 90	24	23	18,0	4,0	20,1	30	48	63	73	35	0,274	0,579
FV 112	29	28	21,5	5,0	22,2	32	55	72	87	40	0,444	0,946
FV 140	34	32	25,0	5,5	26,2	36	60	80	95	45	0,591	1,349
FV 180	44	42	34,0	6,5	30,2	42	70	100	120	50	1,052	2,732
FV 250	54	50	40,0	8,0	36,2	50	80	125	145	60	1,625	5,259
FV 315	64	60	48,0	10,0	42,2	60	90	140	170	70	2,415	7,950
FV 400	68	64	52,0	10,0	44,2	60	100	150	185	70	3,248	9,732
FV 500	78	72	57,0	12,0	50,2	70	110	160	195	80	4,396	12,733
FV 630	88	80	62,0	14,0	56,2	80	120	170	210	100	5,882	16,575

Conveyor chains with solid pins — Type FV — DIN 8165 part 1 — Sheet 1/2
Double-strand chains

without rollers



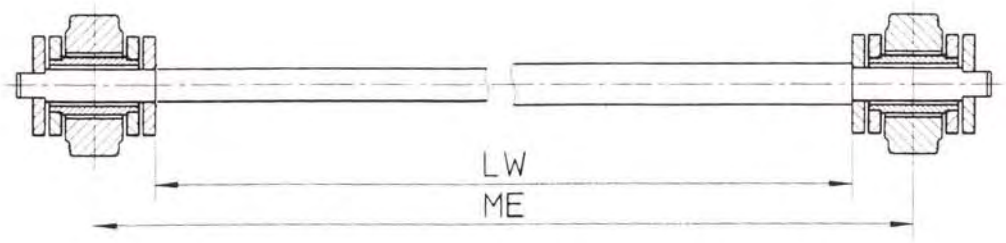
with small rollers of form A according to DIN 8166



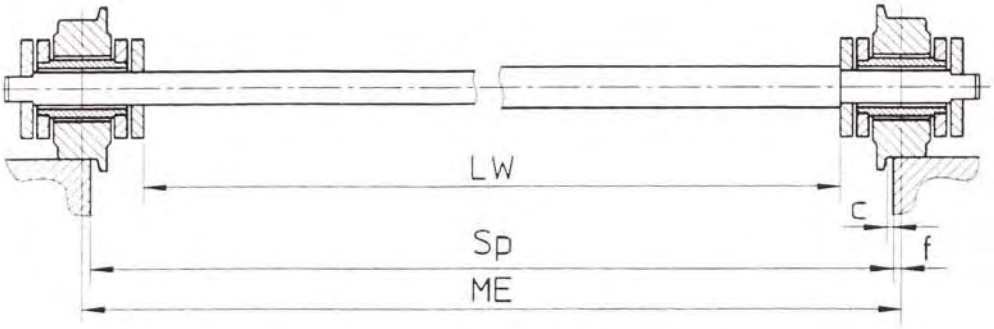
DIN number of chain	Sp	Track width mm 250	315	400	500	630	800	1000	1250
FV 40	ME	256	321	406	506	636	---	---	---
	LW	225	290	375	475	605	---	---	---
FV 63	ME	257	322	407	507	637	807	---	---
	LW	218	283	368	468	598	768	---	---
FV 90	ME	259	324	409	509	639	809	1009	---
	LW	213	278	363	463	593	763	963	---
FV 112	ME	260	325	410	510	640	810	1010	1260
	LW	205	270	355	455	585	755	955	1205
FV 140	ME	262	327	412	512	642	812	1012	1262
	LW	202	267	352	452	582	752	952	1202
FV 180	ME	270	335	420	520	650	820	1020	1270
	LW	191,5	256,5	341,5	441,5	571,5	741,5	941,5	1191,5
FV 250	ME	273	338	423	523	653	823	1023	1273
	LW	184	249	334	434	564	734	934	1184
FV 315	ME	279	344	429	529	659	829	1029	1279
	LW	172	237	322	422	552	722	922	1172
FV 400	ME	---	348	433	533	663	833	1033	1283
	LW	---	227	312	412	542	712	912	1162
FV 500	ME	---	350	435	535	665	835	1035	1285
	LW	---	219	304	404	534	704	904	1154
FV 630	ME	---	---	435	535	665	835	1035	1285
	LW	---	---	294	394	524	694	894	1144

Conveyor chains with solid pins Type FV DIN 8165 part 1 Sheet 2/2
Double-strand chains

with runners of form B and C according to DIN 8166

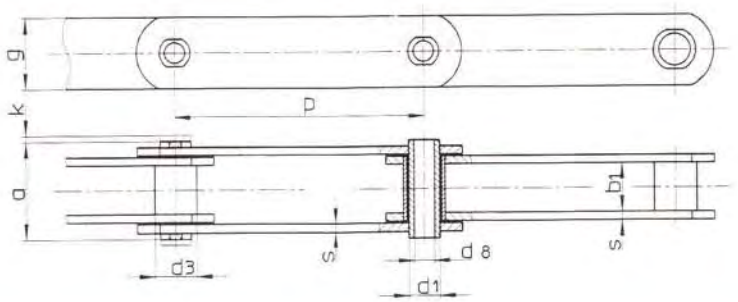


with flanged runners of form D and E according to DIN 8166



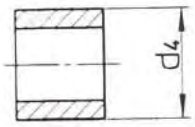
DIN number of chain	Track width mm							Axis ø	Axis ø
	Sp	1400	1600	1800	2000	c mm	f mm	d_1 mm	d_8 mm
FV 40	ME	---	---	---	---	1,0	3,0	10	15
	LW	---	---	---	---				
FV 63	ME	---	---	---	---	1,5	3,5	12	18
	LW	---	---	---	---				
FV 90	ME	---	---	---	---	2,0	4,5	14	20
	LW	---	---	---	---				
FV 112	ME	---	---	---	---	2,5	5,0	16	22
	LW	---	---	---	---				
FV 140	ME	---	---	---	---	3,0	6,0	18	26
	LW	---	---	---	---				
FV 180	ME	1420	1620	1820	2020	3,0	10,0	20	30
	LW	1341,5	1541,5	1741,5	1941,5				
FV 250	ME	1423	1623	1823	2023	3,5	11,5	26	36
	LW	1334	1534	1734	1934				
FV 315	ME	1429	1629	1829	2029	3,5	14,5	30	42
	LW	1322	1522	1722	1922				
FV 400	ME	1433	1633	1833	2033	3,5	16,5	32	44
	LW	1312	1512	1712	1912				
FV 500	ME	1435	1635	1835	2035	3,5	17,5	36	50
	LW	1304	1504	1704	1904				
FV 630	ME	1435	1635	1835	2035	4,5	17,5	42	56
	LW	1294	1494	1694	1894				

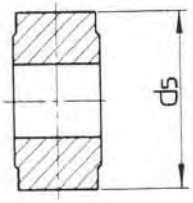
Conveyor chains with hollow pins Type FV similar to DIN 8165 part 1 Sheet 1/2

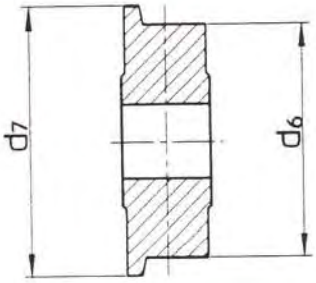


DIN number of chain	Pitch p	Inside width b_1	Hollow pin ø d_8/d_1	Bushes ø d_3	Small rollers ø d_4	Rollers ø d_5	Flanged rollers ø d_6/d_7	Link plate width g	Link plate thickness s
					mm				
FV 40	40 63 100	18	6/10	15	20	32	40/48	26	3
FV 63	63 100 125 160	22	8/12	18	26	40	50/60	30	4
FV 90	63 100 125 160 200 250	25	10/14	20	30	48	63/73	35	5
FV 112	100 125 160 200 250	30	10/16	22	32	55	72/87	40	6
FV 140	100 125 160 200 250 315	35	12/18	26	36	60	80/95	45	6
FV 180	125 160 200 250 315 400	45	14/20	30	42	70	100/120	50	8
FV 250	125 160 200 250 315 400	55	18/26	36	50	80	125/145	60	8
FV 315	160 200 250 315 400	65	20/30	42	60	90	140/170	70	10
FV 400	160 200 250 315 400	70	22/32	44	60	100	150/185	70	12
FV 500	160 200 250 315 400 500	80	26/36	50	70	110	160/195	80	12
FV 630	200 250 315 400 500	90	30/42	56	80	120	170/210	100	12

Conveyor chains with hollow pins Type FV similar to DIN 8165 part 1 Sheet 2/2



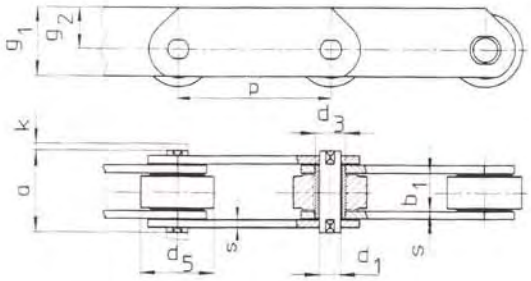




DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight of chain without roller	with small roller	with large roller	with flanged roller
	mm		kN	cm²	N/cm²	kg/m			
FV 40	34,6	3,5	30	2,5	2000	2,54 2,06 1,75	2,96 2,33 1,92	4,54 3,33 2,55	- 4,52 3,30
FV 63	43,0	3,5	38	3,7	1700	3,28 2,76 2,59 2,43	3,97 3,20 2,94 2,71	5,80 4,35 3,86 3,43	8,11 5,81 5,02 4,34
FV 90	50,5	3,5	45	5,0	1500	4,84 4,07 3,80 3,57 3,41 3,28	5,98 4,78 4,38 4,02 3,76 3,56	9,17 6,79 5,98 5,28 4,77 4,37	- 9,59 8,22 7,02 6,17 5,48
FV 112	59,5	4,0	74	6,8	1800	5,84 5,43 5,06 4,80 4,60	6,78 6,18 5,65 5,27 4,97	10,27 8,97 7,83 7,02 6,37	14,95 12,71 10,76 9,36 8,24
FV 140	64,5	4,0	85	8,6	1650	7,09 6,52 6,02 5,66 5,38 5,14	8,34 7,52 6,81 6,29 5,88 5,54	12,98 11,23 9,70 8,61 7,74 7,01	19,63 16,55 13,86 11,94 10,40 9,13
FV 180	84,0	4,5	96	12,3	1300	10,04 9,22 8,63 8,16 7,77 7,45	11,87 10,65 9,77 9,07 8,50 8,03	18,44 15,78 13,88 12,36 11,11 10,08	30,70 25,36 21,54 18,49 15,97 13,91
FV 250	94,0	5,0	166	18,7	1480	13,39 12,11 11,19 10,46 9,86 9,36	16,53 14,56 13,16 12,03 11,10 10,35	26,36 22,25 19,30 16,95 15,01 13,42	- 42,01 35,11 29,60 25,05 21,32
FV 315	112,0	5,5	236	25,8	1520	18,76 17,21 15,96 14,94 14,10	23,22 20,78 18,82 17,20 15,88	33,83 29,26 25,60 22,59 20,12	- 53,72 45,18 38,12 32,36
FV 400	125,0	6,0	254	30,7	1370	22,06 20,29 18,87 17,70 16,74	26,41 23,77 21,65 19,91 18,48	42,26 36,45 31,79 27,95 24,82	- 66,19 55,59 46,84 39,69
FV 500	135,0	6,0	292	38,2	1270	27,07 24,67 22,75 21,17 19,87 18,91	34,28 30,44 27,36 24,83 22,76 21,22	54,41 46,55 40,25 35,06 30,81 27,66	- 83,05 69,45 58,23 49,06 42,26
FV 630	145,0	6,5	407	48,7	1390	33,13 30,27 27,91 25,99 24,56	41,99 37,36 33,54 30,41 28,10	62,41 53,70 46,50 40,62 36,27	- 89,68 75,06 63,12 54,26

6.2 Carrying Chains with raised Link Plates, DIN 8165

Conveyor chains with solid pins — Type FVT — DIN 8165 part 3 — Sheet 1/2
Carrying chains with raised link plates



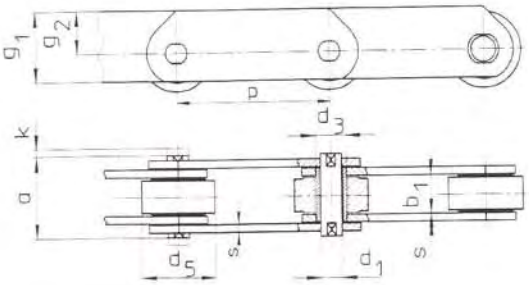
DIN number of chain	Pitch p	Inside width b_1	Pins ø d_1	Bushes ø d_3	Rollers ø d_5	Overall width of link plate g_1	Height above chain centre g_2	Thickness of link plate s
				mm				
FVT 40	40 63 100	18	10	15	32	35	22,0	3
FVT 63	63 100 125 160	22	12	18	40	40	25,0	4
FVT 90	63 100 125 160 200 250	25	14	20	48	45	27,5	5
FVT 112	100 125 160 200 250	30	16	22	55	50	30,0	6
FVT 140	100 125 160 200 250 315	35	18	26	60	60	37,5	6
FVT 180	125 160 200 250 315 400	45	20	30	70	70	45,0	8
FVT 250	125 160 200 250 315 400	55	26	36	80	80	50,0	8
FVT 315	160 200 250 315 400	65	30	42	90	90	55,0	10
FVT 400	160 200 250 315 400	70	32	44	100	90	55,0	12
FVT 500	160 200 250 315 400 500	80	36	50	110	100	60,0	12
FVT 630	200 250 315 400 500	90	42	56	120	120	70,0	12

Conveyor chains with solid pins
Carrying chains with raised Link Plates

Type FVT

DIN 8165 part 3

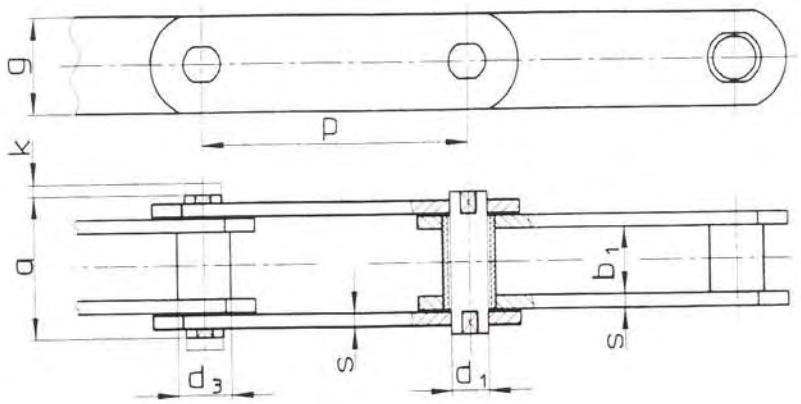
Sheet 2/2



DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight
	mm		kN	cm²	N/cm²	kg/m
FVT 40	37	3,5	40	2,5	2680	5,54 4,12 3,20
FVT 63	46	4,5	63	3,7	2840	7,13 5,42 4,84 4,33
FVT 90	53	4,5	90	5,0	3000	11,15 8,33 7,37 6,53 5,93 5,45
FVT 112	63	4,5	112	6,8	2750	12,28 10,76 9,44 8,49 7,74
FVT 140	68	6,0	140	8,6	2720	15,91 13,86 12,06 10,78 9,75 8,91
FVT 180	86	7,0	180	12,3	2440	23,09 19,96 17,73 15,94 14,46 13,26
FVT 250	98	8,0	250	18,7	2230	32,08 27,26 23,82 21,06 18,79 16,93
FVT 315	117	8,0	315	25,8	2040	40,87 35,52 31,24 27,71 24,83
FVT 400	131	10,0	400	30,7	2170	51,41 44,52 39,01 34,46 30,74
FVT 500	141	10,0	500	38,2	2180	65,53 56,19 48,72 42,56 37,52 33,78
FVT 630	153	10,0	630	48,7	2160	74,77 64,34 55,73 48,69 43,47

6.3 Conveyor chains, DIN 8167/DIN 8168

Conveyor chains with solid pins — Type M — DIN 8167 part 1 — Sheet 1/4
Singel-strand chains



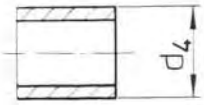
DIN number of chain	Pitch	Inside width	Pins	Bushes	Small rollers	Rollers	Flanged rollers	Link plate width	Link plate thickness
	p	b_1	ø d_1	ø d_3	ø d_4	ø d_5	ø d_5/d_6	g	s
					mm				
M 20	40 50 63 80 100 125 160	16	6	9	12,5	25	25/30	18	2,5
M 28	50 63 80 100 125 160 200	18	7	10	15	30	30/36	20	3,0
M 40	63 80 100 125 160 200 250	20	8,5	12,5	18	36	36/42	25	3,5
M 56	63 80 100 125 160 200 250	24	10	15	21	42	42/50	30	4,0
M 80	80 100 125 160 200 250 315	28	12	18	25	50	50/60	35	5,0
M 112	80 100 125 160 200 250 315 400	32	15	21	30	60	60/70	40	6,0

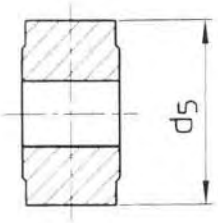
Conveyor chains with solid pins
Single-strand chains

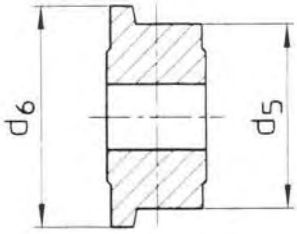
Type M

DIN 8167 part 1

Sheet 2/4

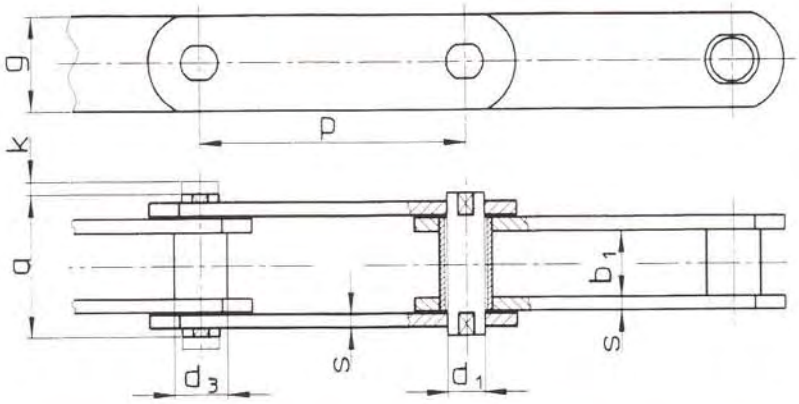






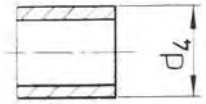
DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight of chain			
						without roller	with small roller	with large roller	with flanged roller
	mm		kN	cm²	N/cm²	kg/m			
M 20	35	7	20	1,32	2160	1,28 1,16 1,07 0,99 0,93 0,89 0,85	1,44 1,29 1,17 1,07 1,00 0,94 0,89	2,48 2,12 1,83 1,59 1,41 1,27 1,15	2,64 2,25 1,93 1,67 1,48 1,32 1,19
M 28	40	8	28	1,75	2290	1,57 1,44 1,34 1,26 1,19 1,14 1,10	1,82 1,64 1,49 1,38 1,29 1,22 1,16	3,18 2,72 2,34 2,06 1,84 1,64 1,50	3,38 2,88 2,47 2,16 1,92 1,71 1,55
M 40	45	9	40	2,38	2400	2,23 2,05 1,91 1,81 1,71 1,64 1,59	2,53 2,28 2,10 1,96 1,83 1,74 1,66	4,27 3,65 3,20 2,83 2,51 2,29 2,10	4,52 3,85 3,35 2,96 2,61 2,36 2,17
M 56	52	10	56	3,30	2430	3,32 3,01 2,79 2,61 2,45 2,33 2,24	3,78 3,38 3,08 2,84 2,63 2,48 2,36	6,67 5,66 4,90 4,30 3,77 3,39 3,09	7,08 5,98 5,16 4,51 3,93 3,52 3,19
M 80	62	12	80	4,68	2440	4,64 4,26 3,96 3,69 3,50 3,35 3,23	5,24 4,74 4,34 3,99 3,75 3,55 3,38	9,04 7,79 6,78 5,90 5,27 4,76 4,35	9,61 8,23 7,14 6,18 5,49 4,94 4,49
M 112	73	14	112	6,75	2370	6,73 6,13 5,66 5,25 4,95 4,71 4,52 4,36	7,79 6,98 6,34 5,78 5,38 5,05 4,79 4,57	13,93 11,90 10,27 8,85 7,83 7,02 6,35 5,80	14,70 12,52 10,77 9,24 8,14 7,27 6,55 5,96

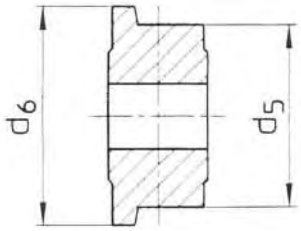
Conveyor chains with solid pins — Type M — DIN 8167 part 1 — Sheet 3/4
Single-strand chains



DIN number of chain	Pitch p	Inside width b_1	Pins ø d_1	Bushes ø d_3	Small rollers ø d_4	Rollers ø d_5	Flanged rollers ø d_5/d_6	Link plate width g	Link plate thickness s
					mm				
M 160	100 125 160 200 250 315 400 500	37	18	25	36	70	70/85	50	7
M 224	125 160 200 250 315 400 500 630	43	21	30	42	85	85/100	60	8
M 315	160 200 250 315 400 500 630	48	25	36	50	100	100/120	70	10
M 450	200 250 315 400 500 630 800	56	30	42	60	120	120/140	80	12
M 630	250 315 400 500 630 800 1000	66	36	50	70	140	140/170	100	14
M 900	250 315 400 500 630 800 1000	78	44	60	85	170	170/210	120	16

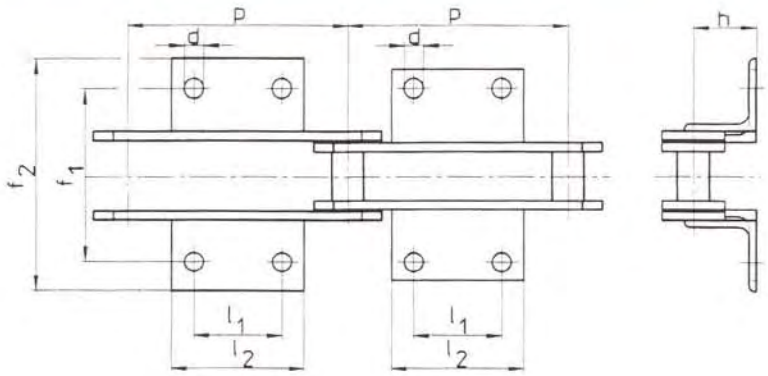
Conveyor chains with solid pins — Type M — DIN 8167 part 1 — Sheet 4/4
Single-strand chains





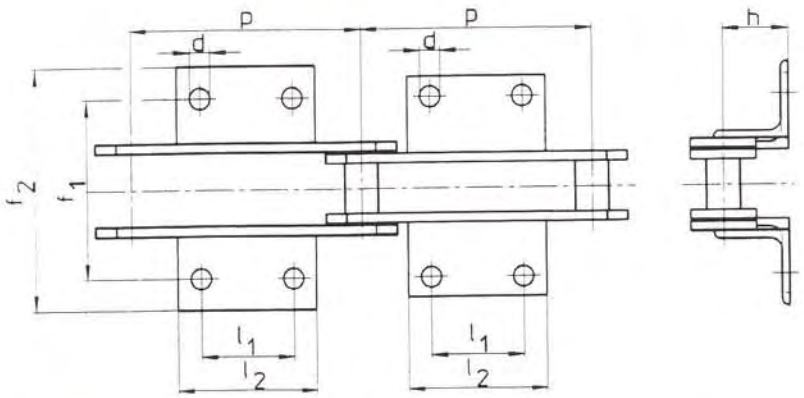
DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight of chain without roller	with small roller	with large roller	with flanged roller
	mm		kN	cm²	N/cm²	kg/m			
M 160	85	16	160	9,36	2440	9,61	11,06	18,76	20,04
						8,78	9,94	16,11	17,13
						8,06	8,97	13,79	14,58
						7,55	8,28	12,13	12,77
						7,14	7,72	10,80	11,31
						6,80	7,26	9,71	10,11
						6,52	6,89	8,81	9,13
						6,32	6,61	8,15	8,40
M 224	98	18	224	12,60	2540	12,99	14,73	25,69	27,12
						11,79	13,16	21,72	22,84
						10,94	12,03	18,88	19,78
						10,26	11,13	16,61	17,33
						9,70	10,39	14,74	15,31
						9,24	9,78	13,21	13,66
						8,90	9,34	12,07	12,43
						8,62	8,96	11,17	11,42
M 315	112	21	315	17,50	2570	18,05	20,18	33,37	35,45
						16,64	18,34	28,89	30,56
						15,51	16,87	25,31	26,64
						14,57	15,66	22,36	23,41
						13,81	14,67	19,94	20,77
						13,25	13,93	18,15	18,82
						12,78	13,32	16,67	17,20
M 450	135	25	450	24,60	2620	24,05	27,11	44,43	46,72
						22,25	24,70	38,56	40,39
						20,77	22,71	33,71	35,17
						19,56	21,09	29,75	30,90
						18,66	19,89	26,82	27,73
						17,92	18,89	24,39	25,12
						17,32	18,08	22,41	22,98
M 630	154	30	630	34,56	2610	34,58	38,36	60,98	64,63
						31,98	34,98	52,93	55,83
						29,85	32,22	46,36	48,63
						28,28	30,17	41,48	43,30
						26,98	28,48	37,46	38,90
						25,92	27,10	34,17	35,31
						25,13	26,08	31,73	32,64
M 900	180	37	900	49,28	2610	51,04	57,65	96,13	103,81
						46,73	51,98	82,52	88,61
						43,20	47,34	71,39	76,19
						40,59	43,90	63,14	66,98
						38,43	41,06	56,33	59,38
						36,67	38,74	50,77	53,17
						35,37	37,02	46,64	48,56

Fixing brackets for conveyor chains | Type M | DIN 8167 part 2 | Sheet 1/2



DIN number of chain	Pitch p	Length of bracket l_2	Hole pitch l_1	Hole ø d	Distance between hole centres f_1	Overall width of chain f_2 (max)	Heigth above chain centre h	Bracket DIN 1028/ DIN 1029
				mm				
M 20	40	14	-	6,6	54	84	16	25x25x3
	50	14	-					
	63	35	20					
	80	50	35					
	100	65	50					
	125	65	50					
	160	65	50					
M 28	50	20	-	9,0	64	100	20	20x30x3
	63	20	-					
	80	45	25					
	100	60	40					
	125	85	65					
	160	85	65					
	200	85	65					
M 40	63	20	-	9,0	70	112	25	30x30x3
	80	40	20					
	100	60	40					
	125	85	65					
	160	85	65					
	200	85	65					
	250	85	65					
M 56	63	22	-	11,0	88	140	30	40x40x4
	80	22	-					
	100	50	25					
	125	75	50					
	160	110	85					
	200	110	85					
	250	110	85					
M 80	80	22	-	11,0	96	160	35	40x40x4
	100	22	-					
	125	75	50					
	160	110	85					
	200	150	125					
	250	150	125					
	315	150	125					
M 112	80	28	-	14,0	110	184	40	50x50x6
	100	28	-					
	125	65	35					
	160	95	65					
	200	130	100					
	250	130	100					
	315	130	100					
	400	130	100					

Fixing brackets for conveyor chains | Type M | DIN 8167 part 2 | Sheet 2/2

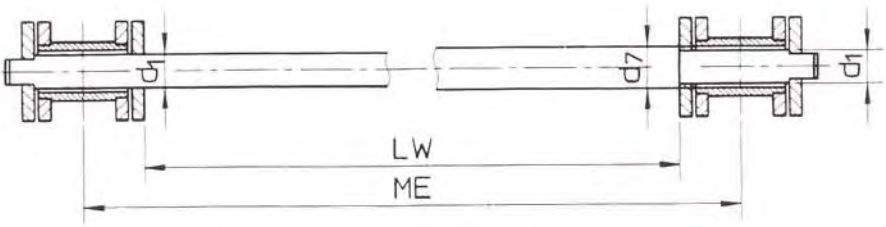


DIN number of chain	Pitch p	Length of bracket l_2	Hole pitch l_1	Hole ø d	Distance between hole centres f_1	Overall width of chain f_2 (max)	Heigth above chain centre h	Bracket DIN 1028
				mm				
M 160	100	30	---	14,0	124	200	45	50x50x6
	125	30	---					
	160	80	50					
	200	115	85					
	250	175	145					
	315	175	145					
	400	175	145					
	500	175	145					
M 224	125	35	---	18,0	140	228	55	60x60x8
	160	35	---					
	200	100	65					
	250	160	125					
	315	225	190					
	400	225	190					
	500	225	190					
	630	225	190					
M 315	160	35	---	18,0	160	250	65	70x70x9
	200	85	50					
	250	135	100					
	315	190	155					
	450	190	155					
	500	190	155					
	630	190	155					
M 450	200	40	---	18,0	180	280	75	70x70x9
	250	125	85					
	315	195	155					
	400	280	240					
	500	280	240					
	630	280	240					
	800	280	240					
M 630	250	50	---	24,0	230	380	90	100x100x12
	315	150	100					
	400	240	190					
	500	350	300					
	630	350	300					
	800	350	300					
	1000	350	300					
M 900	250	60	---	30,0	280	480	110	120x120x15
	315	125	65					
	400	215	155					
	500	300	240					
	630	300	240					
	800	300	240					
	1000	300	240					

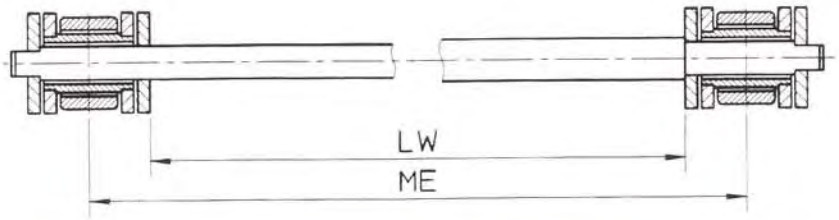
Conveyor chains with solid pins | Type M | DIN 8167 part 1 | Sheet 1/2

Double-strand chains

without rollers



with small rollers form A according to DIN 8169

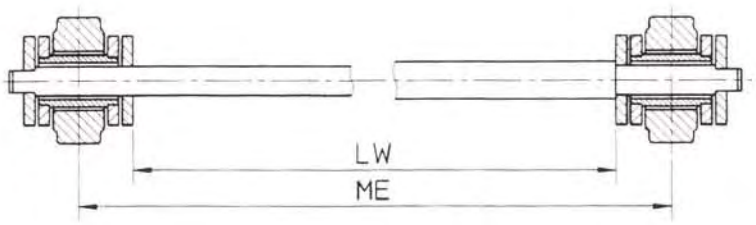


DIN number of chain		Track width mm							
	Sp	250	315	400	500	630	800	1000	1250
M 20	ME	256	321	406	506	-	-	-	-
	LW	228,6	293,6	378,6	478,6	-	-	-	-
M 28	ME	257	322	407	507	-	-	-	-
	LW	225,4	290,4	375,4	475,4	-	-	-	-
M 40	ME	257	322	407	507	637	-	-	-
	LW	221,4	286,4	371,4	471,4	601,4	-	-	-
M 56	ME	259	324	409	509	639	-	-	-
	LW	217,2	282,2	367,2	467,2	597,2	-	-	-
M 80	ME	260	325	410	510	640	810	-	-
	LW	210,2	275,2	360,2	460,2	590,2	760,2	-	-
M 112	ME	260	325	410	510	640	810	1010	-
	LW	202	267	352	452	582	752	952	-
M 160	ME	261	326	411	511	641	811	1011	1261
	LW	194	259	344	444	574	744	944	1194
M 224	ME	264	329	414	514	644	814	1014	1264
	LW	187	252	337	437	567	737	937	1187
M 315	ME	265	330	415	515	645	815	1015	1265
	LW	173,8	238,8	323,8	423,8	553,8	723,8	923,8	1173,8
M 450	ME	---	331	416	516	646	816	1016	1266
	LW	---	223,4	308,4	408,4	538,4	708,4	908,4	1158,4
M 630	ME	---	337	422	522	652	822	1022	1272
	LW	---	211	296	396	526	696	896	1146
M 900	ME	---	---	427	527	657	827	1027	1277
	LW	---	---	281	381	511	681	881	1131

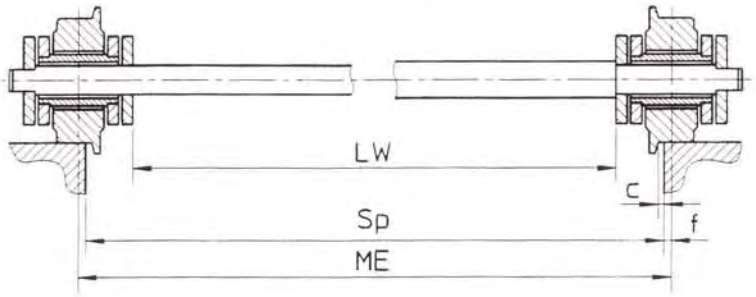
Conveyor chains with solid pins — Type M — DIN 8167 part 1 — Sheet 2/2

Double-strand chains

with rollers form B and C according to DIN 8169

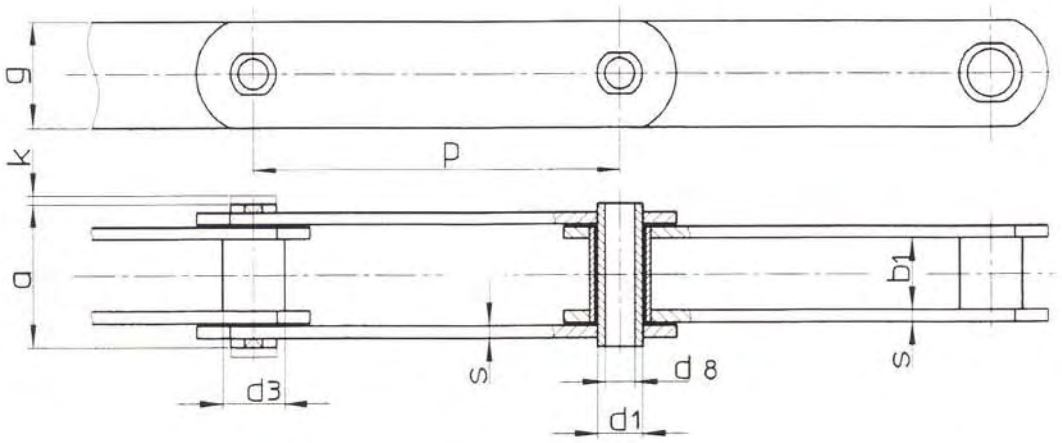


with flanged rollers form D and E according to DIN 8169



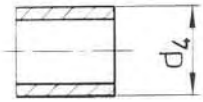
DIN number of chain	Track width mm							Axis ø	Axis ø
	Sp	1400	1600	1800	2000	c mm	f mm	d_1 mm	d_7 mm
M 20	ME	-	-	-	-	1,0	3,0	6,0	7,0
	LW	-	-	-	-				
M 28	ME	-	-	-	-	1,0	3,5	7,0	8,5
	LW	-	-	-	-				
M 40	ME	-	-	-	-	1,0	3,5	8,5	10,0
	LW	-	-	-	-				
M 56	ME	-	-	-	-	1,5	4,5	10,0	12,0
	LW	-	-	-	-				
M 80	ME	-	-	-	-	2,0	5,0	12,0	15,0
	LW	-	-	-	-				
M 112	ME	-	-	-	-	2,5	5,0	15,0	18,0
	LW	-	-	-	-				
M 160	ME	-	-	-	-	3,0	5,5	18,0	21,0
	LW	-	-	-	-				
M 224	ME	1414	1614	1814	2014	3,0	7,0	21,0	25,0
	LW	1337	1537	1737	1937				
M 315	ME	1415	1615	1815	2015	3,0	7,5	25,0	30,0
	LW	1323,8	1523,8	1723,8	1923,8				
M 450	ME	1416	1616	1816	2016	3,5	8,0	30,0	35,0
	LW	1308,4	1508,4	1708,4	1908,4				
M 630	ME	1422	1622	1822	2022	3,5	11,0	36,0	42,0
	LW	1296	1496	1696	1896				
M 900	ME	1427	1627	1827	2027	3,5	13,5	44,0	50,0
	LW	1281	1481	1681	1881				

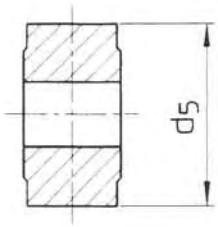
Conveyor chains with hollow pins | Type MC | DIN 8168 part 1 | Sheet 1/2

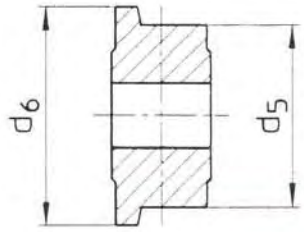


DIN number of chain	Pitch p	Inside width b_1	Hollow pin ø d_8/d_1	Bushes ø d_3	Small rollers ø d_4	Rollers ø d_5	Flanged rollers ø d_5/d_6	Link plate width g	Link plate thickness s
					mm				
MC 28	63	20	8,2/13,0	17,5	25	36	36/42	25	3,5
	80								
	100								
	125								
	160								
MC 56	80	24	10,2/15,5	21,0	30	50	50/60	35	4,0
	100								
	125								
	160								
	200								
	250								
MC 112	100	32	14,3/22,0	29,0	42	70	70/85	50	6,0
	125								
	160								
	200								
	250								
	315								
MC 224	160	43	20,3/31,0	41,0	60	100	100/120	70	8,0
	200								
	250								
	315								
	400								
	500								

Conveyor chains with hollow pins | Type MC | DIN 8168 part 1 | Sheet 2/2

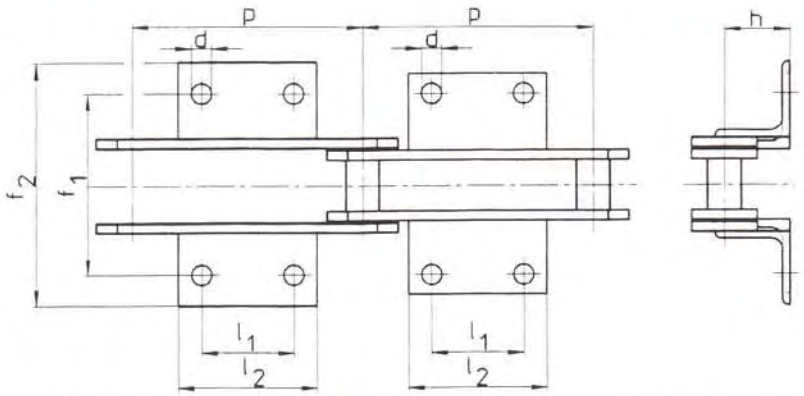






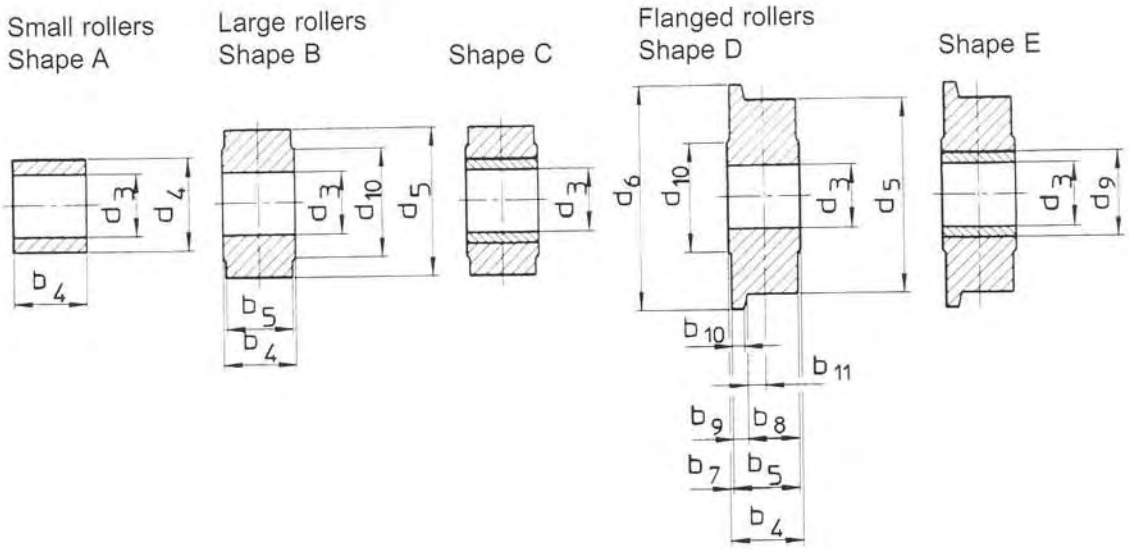
DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight of chain without roller	with small roller	with large roller	with flanged roller
	mm		kN	cm²	N/cm²	kg/m			
MC 28	39,0	3,5	28	3,64	1090	2,27	2,86	4,05	4,29
						2,08	2,55	3,48	3,67
						1,94	2,31	3,06	3,21
						1,83	2,12	2,72	2,84
						1,73	1,96	2,43	2,52
MC 56	45,0	4,0	56	5,11	1560	3,67	4,45	7,18	7,66
						3,37	4,00	6,19	6,57
						3,14	3,64	5,39	5,69
						2,93	3,32	4,69	4,93
						2,79	3,10	4,19	4,38
						2,67	2,92	3,79	3,95
MC 112	62,5	4,8	112	9,90	1610	7,99	9,70	15,40	16,46
						7,33	8,70	13,26	14,11
						6,76	7,83	11,39	12,05
						6,35	7,20	10,05	10,59
						6,02	6,71	8,99	9,41
						5,75	6,29	8,10	8,44
MC 224	82,0	5,5	224	18,60	1720	14,16	17,20	27,17	28,91
						13,09	15,52	23,49	24,88
						12,23	14,18	20,55	21,67
						11,52	13,06	18,13	19,01
						10,94	12,16	16,14	16,84
						10,51	11,48	14,67	15,23

Fixing brackets for conveyor chains | Type MC | DIN 8168 part 2 | Sheet 1/1



DIN number of chain	Pitch	Length of bracket	Hole pitch	Hole	Distance between hole centres	Overall width of chain	Height above chain centre	Bracket DIN 1028
	p	l_2	l_1	ø d	f_1	f_2 (max)	h	
				mm				
MC 28	63	20	---	9,0	70	112	25	30x30x3
	80	40	20					
	100	60	40					
	125	85	65					
	160	85	65					
MC 56	80	25	---	11,0	88	152	35	40x40x4
	100	25	---					
	125	75	50					
	160	110	85					
	200	150	125					
	250	150	125					
MC 112	100	30	---	14,0	110	192	45	50x50x6
	125	30	---					
	160	80	50					
	200	115	85					
	250	175	145					
	315	175	145					
MC 224	160	35	---	18,0	140	220	65	60x60x8
	200	85	50					
	250	135	100					
	315	190	155					
	400	190	155					
	500	190	155					

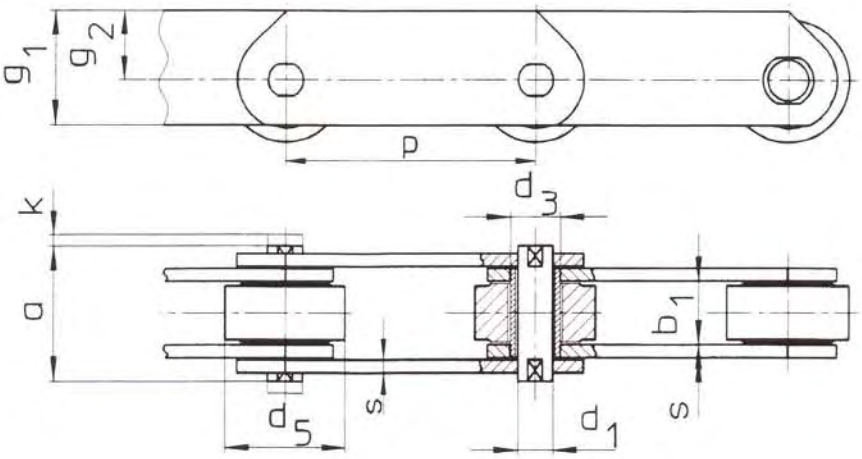
Rollers for conveyor chains DIN 8167/8168 DIN 8169 Sheet 1/1



DIN number of chain	Width							Diameter					Weight	
	b_4	b_5	b_7	b_8	b_9	b_{10}	b_{11}	d_3 C11	d_4	d_5	d_6	d_9 max.	Roller	Flanged roller
	mm												kg	
M 20	15	14	0,5	11,0	3,0	2,5	4,0	9,0	12,5	25	30	---	0,048	0,053
M 28	17	16	0,5	12,5	3,5	3,0	4,5	10,0	15,0	30	36	---	0,081	0,089
M 40	19	18	0,5	13,5	4,5	3,5	4,5	12,5	18,0	36	42	---	0,129	0,142
M 56	23	22	0,5	17,0	5,0	4,0	6,0	15,0	21,0	42	50	---	0,213	0,234
M 80	27	26	0,5	20,0	6,0	5,0	7,0	18,0	25,0	50	60	---	0,354	0,392
M 112	31	29	1,0	22,0	7,0	6,0	7,5	21,0	30,0	60	70	30	0,579	0,632
M 160	36	34	1,0	25,5	8,5	7,0	8,5	25,0	36,0	70	85	34	0,919	1,032
M 224	42	40	1,0	30,0	10,0	8,0	10,0	30,0	42,0	85	100	40	1,593	1,753
M 315	47	45	1,0	33,0	12,0	10,0	10,5	36,0	50,0	100	120	46	2,443	2,745
M 450	55	51	2,0	37,0	14,0	12,0	11,5	42,0	60,0	120	140	54	4,051	4,471
M 630	65	61	2,0	45,0	16,0	13,5	14,5	50,0	70,0	140	170	65	6,548	7,389
M 900	76	70	3,0	52,0	18,0	15,0	17,0	60,0	85,0	170	210	75	11,233	12,755
MC 28	19	18	0,5	13,5	4,5	3,5	4,5	17,5	25,0	36	42	---	0,112	0,124
MC 56	23	22	0,5	17,0	5,0	4,0	6,0	21,0	30,0	50	60	---	0,284	0,315
MC 112	31	29	1,0	22,0	7,0	6,0	7,5	29,0	42,0	70	85	38	0,746	0,837
MC 224	42	40	1,0	30,0	10,0	8,0	10,0	41,0	60,0	100	120	52	2,091	2,339

6.4 Carrying Chains with raised Link Plates, DIN 8167

Conveyor chains with solid pins — Type MT — DIN 8167 part 3 — Sheet 1/4
Carrying chains with raised link plates



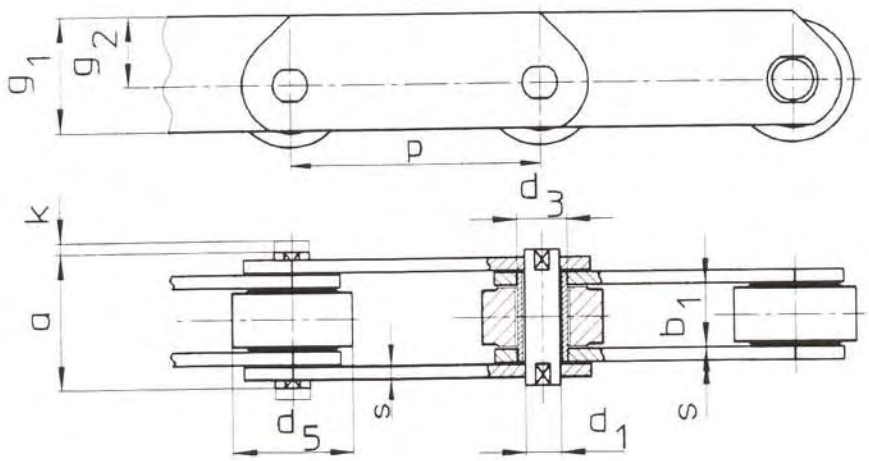
DIN number of chain	Pitch p	Inside width b_1	Pins ø d_1	Bushes ø d_3	Rollers ø d_5	Overall width of link plate g_1	Height above chain centre g_2	Thickness of link plate s
				mm				
MT 20	40 50 63 80 100 125 160	16	6,0	9,0	25	25	16,0	2,5
MT 28	50 63 80 100 125 160 200	18	7,0	10,0	30	30	20,0	3,0
MT 40	63 80 100 125 160 200 250	20	8,5	12,5	36	35	22,5	3,5
MT 56	63 80 100 125 160 200 250	24	10,0	15,0	42	45	30,0	4,0
MT 80	80 100 125 160 200 250 315	28	12,0	18,0	50	50	32,5	5,0

Conveyor chains with solid pins
Carrying chains with raised link plates

Type MT

DIN 8167 part 3

Sheet 2/4



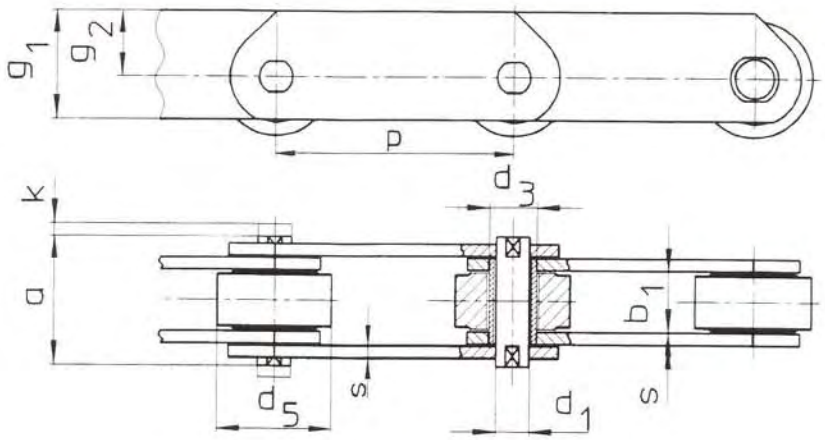
DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight
	mm		kN	cm²	N/cm²	kg/m
MT 20	35	7,0	20	1,32	2160	3,01 2,61 2,27 2,00 1,79 1,63 1,49
MT 28	40	8,0	28	1,75	2290	4,02 3,48 3,04 2,71 2,45 2,23 2,06
MT 40	45	9,0	40	2,38	2400	5,29 4,58 4,05 3,62 3,25 2,99 2,77
MT 56	52	10,0	56	3,30	2430	8,39 7,21 6,33 5,63 5,02 4,58 4,23
MT 80	62	12,0	80	4,68	2440	11,17 9,72 8,56 7,55 6,82 6,24 5,76

Conveyor chains with solid pins
Carrying chains with raised link plates

Type MT

DIN 8167 part 3

Sheet 3/4



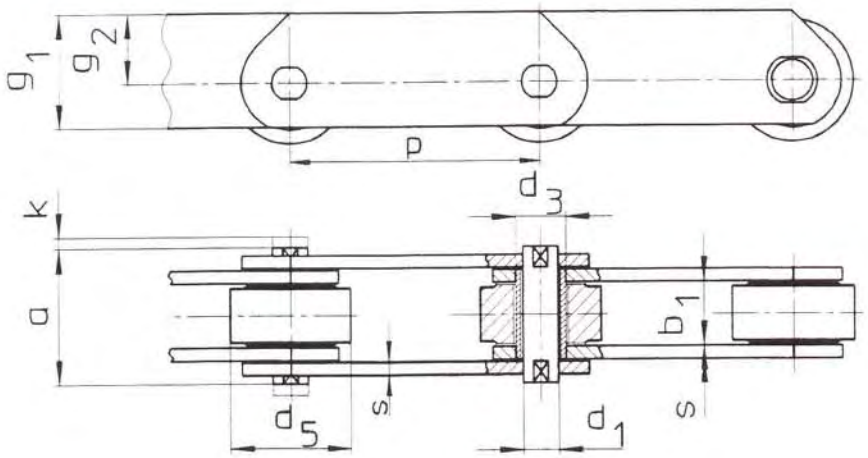
DIN number of chain	Pitch p	Inside width b_1	Pins ø d_1	Bushes ø d_3	Rollers ø d_5	Overall width of link plate g_1	Height above chain centre g_2	Thickness of link plate s
				mm				
MT 112	80 100 125 160 200 250 315	32	15,0	21,0	60	60	40,0	6,0
MT 160	100 125 160 200 250 315	37	18,0	25,0	70	70	45,0	7,0
MT 224	125 160 200 250 315 400	43	21,0	30,0	85	90	60,0	8,0
MT 315	160 200 250 315 400	48	25,0	36,0	100	100	65,0	10,0
MT 450	200 250 315 400 500	56	30,0	42,0	120	120	80,0	12,0
MT 630	250 315 400 500	66	36,0	50,0	140	140	90,0	14,0
MT 900	250 315 400 500	78	44,0	60,0	170	180	120,0	16,0

Conveyor chains with solid pins
Carrying chains with raised link plates

Type MT

DIN 8167 part 3

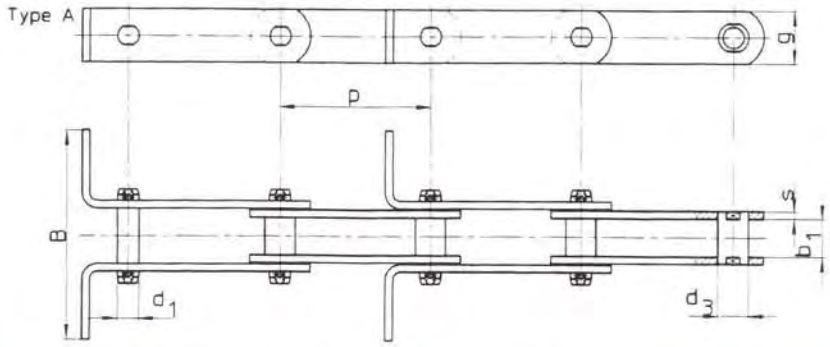
Sheet 4/4



DIN number of chain	Max. rivet pin length a	Max. projection of closing pin k	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight
	mm		kN	cm²	N/cm²	kg/m
MT 112	73	14,0	112	6,75	2370	17,51 15,14 13,24 11,58 10,39 9,45 8,66
MT 160	85	16,0	160	9,36	2440	23,03 19,96 17,28 15,36 13,83 12,56
MT 224	98	18,0	224	12,60	2540	32,31 27,72 24,44 21,81 19,64 17,87
MT 315	112	21,0	315	17,50	2570	41,52 36,36 32,23 28,82 26,03
MT 450	135	25,0	450	24,60	2620	56,92 50,06 44,39 39,76 36,33
MT 630	154	30,0	630	34,56	2610	75,88 66,58 58,97 53,33
MT 900	180	37,0	900	49,28	2610	123,44 107,30 94,10 84,33

6.5 Trough Conveyor Chains, DIN 8165/8167

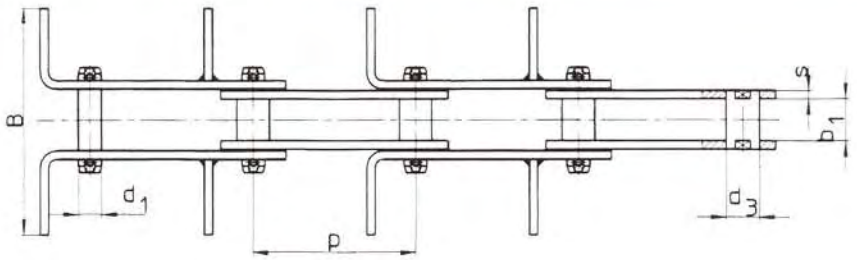
Trough conveyor chains with solid pins Type TF similar to DIN 8165 part 1 Sheet 1/1



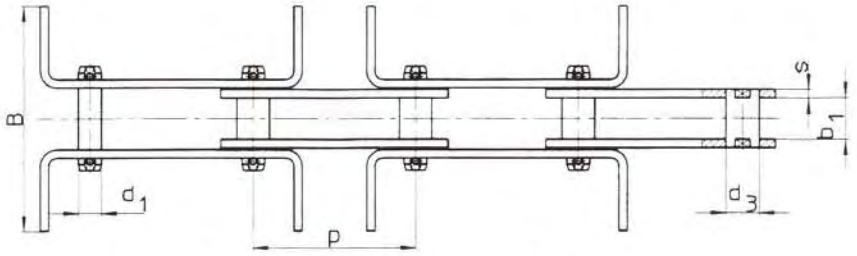
DIN number of chain	Pitch p	Inside width b_1	Pins ø d_1	Bushes ø d_3	Width of link plate g	Thickness of link plate s	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight without scraper
			mm				kN	cm²	N/cm²	kg/m
TF 40	40	18	10	15	26	3	40	2,5	2680	2,70
	63									2,16
	100									1,82
TF 63	63	22	12	18	30	4	63	3,7	2840	3,52
	100									2,91
	125									2,71
	160									2,53
TF 90	63	25	14	20	35	5	90	5,0	3000	5,28
	100									4,34
	125									4,03
	160									3,75
	200									3,55
	250									3,39
TF 112	100	30	16	22	40	6	112	6,8	2750	6,17
	125									5,69
	160									5,27
	200									4,97
	250									4,73
TF 140	100	35	18	26	45	6	140	8,6	2720	7,61
	125									6,94
	160									6,35
	200									5,92
	250									5,59
	315									5,31
TF 180	125	45	20	30	50	8	180	12,3	2440	10,78
	160									9,80
	200									9,09
	250									8,53
	315									8,07
	400									7,69
TF 250	125	55	26	36	60	8	250	18,7	2230	14,78
	160									13,19
	200									12,06
	250									11,16
	315									10,41
	400									9,80
TF 315	160	65	30	42	70	10	315	25,8	2040	20,38
	200									18,50
	250									17,00
	315									15,76
	400									14,75
TF 400	160	70	32	44	70	12	400	30,7	2170	24,27
	200									22,05
	250									20,28
	315									18,81
	400									17,62
TF 500	160	80	36	50	80	12	500	38,2	2180	30,40
	200									27,34
	250									24,88
	315									22,86
	400									21,20
	500									19,98
TF 630	200	90	42	56	100	12	630	48,7	2160	36,96
	250									33,34
	315									30,34
	400									27,90
	500									26,09

Trough conveyor chains with solid pins Type TF similar to DIN 8165 part 1 Examples

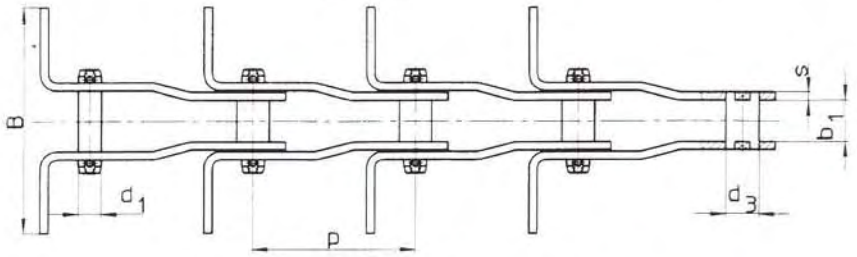
Type B



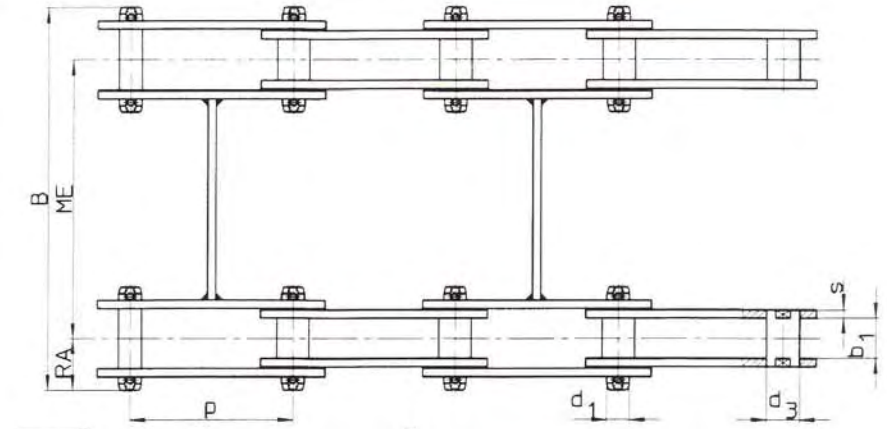
Type C



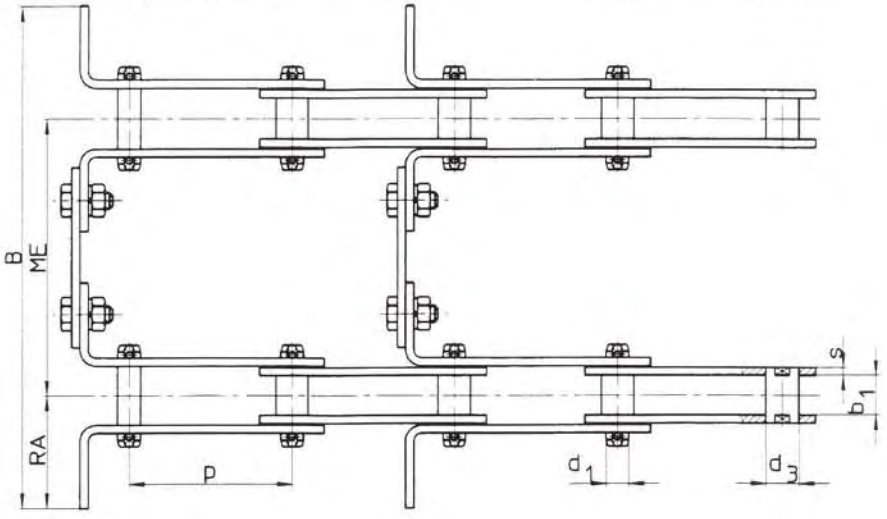
Type D



Type E

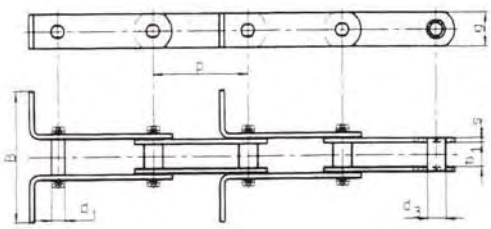


Type F

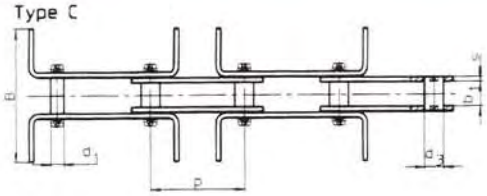


Trough conveyor chains with solid pins Type TFM similar to DIN 8167 part 1 Sheet 1/2

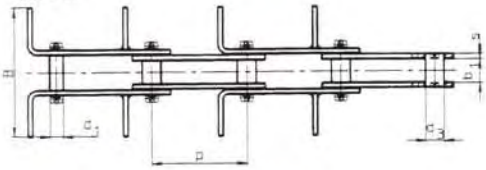
Type A



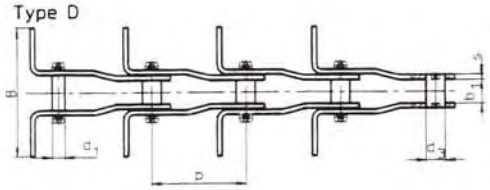
Type C



Type B



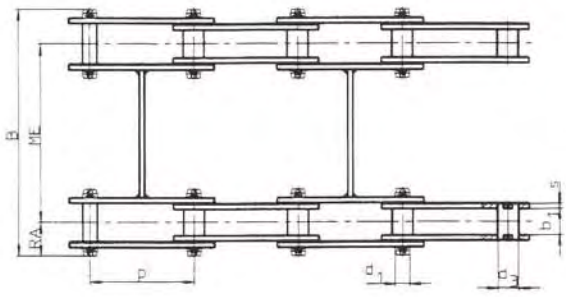
Type D



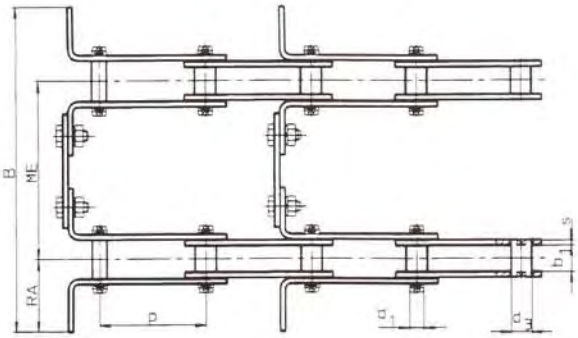
DIN number of chain	Pitch	Inside width	Pins	Bushes	Width of link plate	Thick-ness of link plate	Breaking load	Articula-tion surface	Admis-sible arti-culation surface pressure	Weight without scraper
	p	b_1	ø d_1	ø d_3	g	s				
			mm				kN	cm²	N/cm²	kg/m
TFM 20	40	16	6,0	9,0	18	2,5	20	1,32	2160	1,28
	50									1,16
	63									1,07
	80									0,99
	100									0,93
	125									0,89
	160									0,85
TFM 28	50	18	7,0	10,0	20	3,0	28	1,75	2290	1,57
	63									1,44
	80									1,34
	100									1,26
	125									1,19
	160									1,14
	200									1,10
TFM 40	63	20	8,5	12,5	25	3,5	40	2,38	2400	2,23
	80									2,05
	100									1,91
	125									1,81
	160									1,71
	200									1,64
	250									1,59
TFM 56	63	24	10,0	15,0	30	4,0	56	3,30	2430	3,32
	80									3,01
	100									2,79
	125									2,61
	160									2,45
	200									2,33
	250									2,24
TFM 80	80	28	12,0	18,0	35	5,0	80	4,68	2440	4,64
	100									4,26
	125									3,96
	160									3,69
	200									3,50
	250									3,35
	315									3,23
TFM 112	80	32	15,0	21,0	40	6,0	112	6,75	2370	6,73
	100									6,13
	125									5,66
	160									5,25
	200									4,95
	250									4,71
	315									4,52
	400									4,36

Trough conveyor chains with solid pins Type TFM similar to DIN 8167 part 1 Sheet 2/2

Type E



Type F

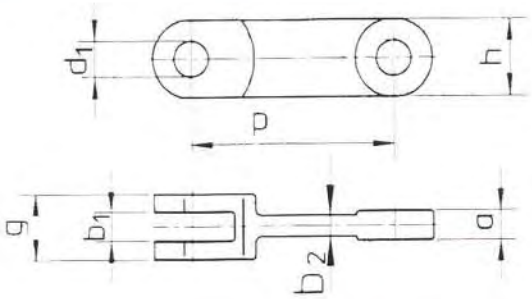


DIN number of chain	Pitch p	Inside width b_1	Pins ø d_1	Bushes ø d_3	Width of link plate g	Thickness of link plate s	Breaking load	Articulation surface	Admissible articulation surface pressure	Weight without scraper
			mm				kN	cm²	N/cm²	kg/m
TFM 160	100	37	18	25	50	7,0	160	9,36	2440	9,61
	125									8,78
	160									8,06
	200									7,55
	250									7,14
	315									6,80
	400									6,52
	500									6,32
TFM 224	125	43	21	30	60	8,0	224	12,60	2540	12,99
	160									11,79
	200									10,94
	250									10,26
	315									9,70
	400									9,24
	500									8,90
	630									8,62
TFM 315	160	48	25	36	70	10,0	315	17,50	2570	18,05
	200									16,64
	250									15,51
	315									14,57
	400									13,81
	500									13,25
	630									12,78
TFM 450	200	56	30	42	80	12,0	450	24,60	2620	24,05
	250									22,25
	315									20,77
	400									19,56
	500									18,66
	630									17,92
	800									17,32
TFM 630	250	66	36	50	100	14,0	630	34,56	2610	34,58
	315									31,98
	400									29,85
	500									28,28
	630									26,98
	800									25,92
	1000									25,13
TFM 900	250	78	44	60	120	16,0	900	49,28	2610	51,04
	315									46,73
	400									43,20
	500									40,59
	630									38,43
	800									36,67
	1000									35,37

6.6 Fork Chains

Fork Chain

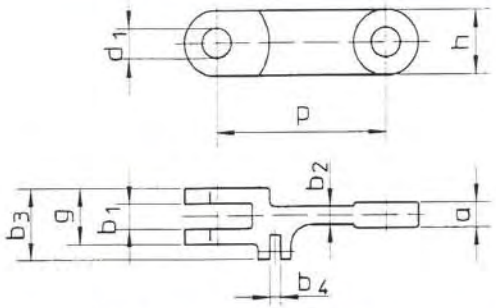
Sheet 1/1



Pitch p	Pins ø d_1	Fork height h	Fork width g	Eye width a	Inside width b_1	Bridge width b_2
			mm			
101,6	14	36	24	9,0	10,0	6,0
101,6	14	36	30	13,0	14,0	9,0
142	22	40	46	20,0	22,0	13,0
142	25	50	42	18,5	20,0	13,0
142	25	50	54	25,0	26,5	16,0
142	25	50	62	28,0	30,0	15,0
142	20	47	24	9,0	10,0	7,0
150	18	36	42	17,0	18,0	12,0
150	25	47	42	16,0	18,0	12,0
150	20	47	24	9,0	10,0	7,0
160	22	45	46	23,0	25,0	15,0
160	25	53	50	23,0	25,0	13,5
200	25	50	60	25,0	27,0	18,0
200	30	60	66	29,0	32,0	20,0
216	35	72	64	26,0	28,0	20,0
220	35	72	64	26,0	28,0	20,0
220	32	75	58	28,0	30,0	25,0
220	35	75	71	31,0	33,0	21,0
250	34	75	70	32,0	34,0	18,0
260	32	75	65	32,0	34,0	20,0
260	32	75	70	32,0	34,0	20,0

Fork chain with groove to retain scraper

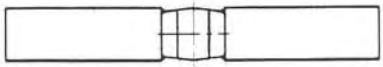
Sheet 1/1

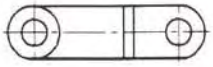


Pitch p	Pins ø d_1	Fork height h	Fork width g	Eye width a	Inside width b_1	Bridge width b_2	Total width b_3	Groove width b_4
				mm				
142	25	50	42	19	20	13	70	12
142	25	50	62	28	30	15	87	12
160	25	50	60	25	27	18	81	12
175	30	60	72	30	32	23	96	16
200	25	50	60	25	27	18	81	12
200	30	60	70	30	32	20	95	13
250	25	50	60	25	27	18	81	12
250	30	60	70	30	32	20	95	13
250	35	70	120	45	47	36	150	21

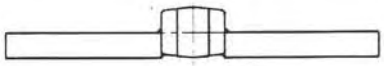
Examples for types of fork chains available

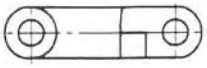
Type 1 (BT)



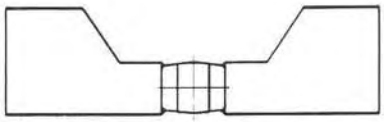


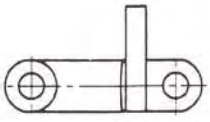
Type 2 (T)



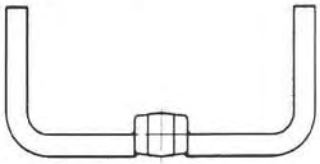


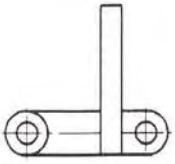
Type 3



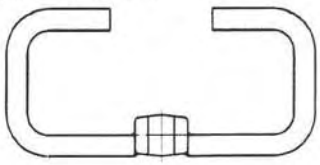


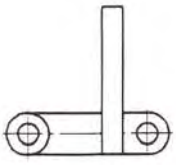
Type 4 (U)



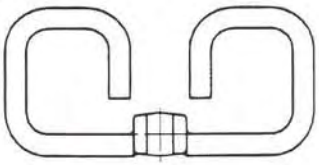


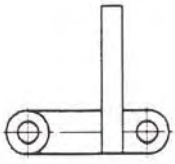
Type 5 (O)



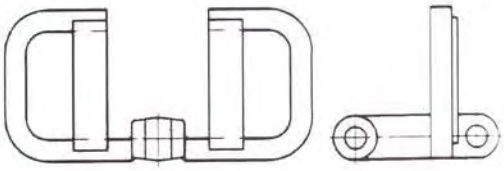


Type 6 (OO)

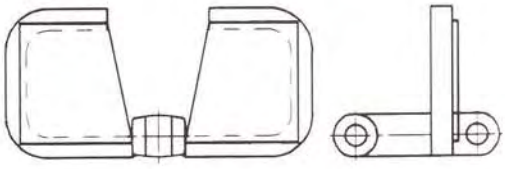




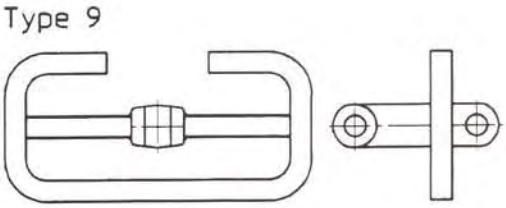
Type 7



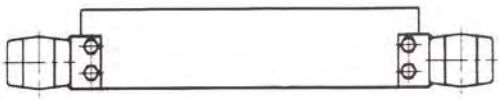
Type 8



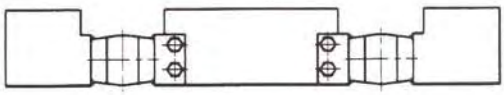
Type 9



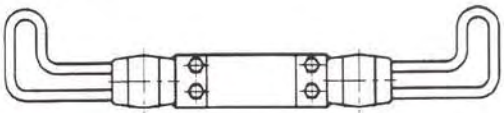
Type 10



Type 11

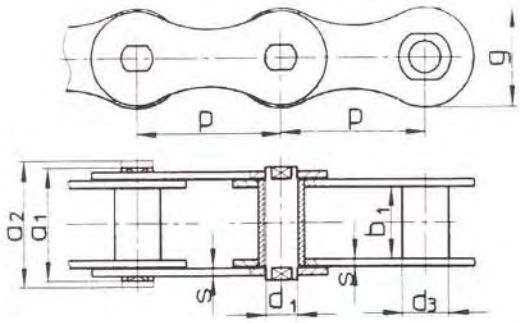


Type 12

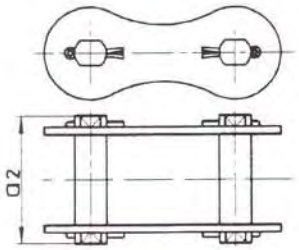


6.7 Bush Chains

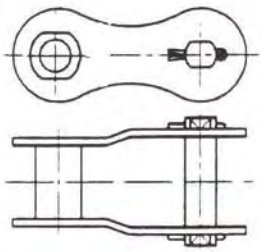
Bush chain | DIN 8164 | Sheet 1/1



A Plug-in link with split-pin fastener



B Cranked link with split-pin fastener

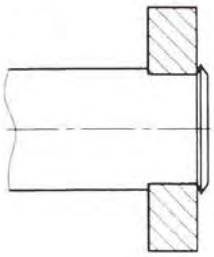


Pitch	Inside width	Pins	Bushes	Link plate width	Link plate thickness	Rivet pin length	Closing pin length	Breaking load	Articulation surface	Split-pin	Weight
p	b_1	ø d_1	ø d_3	g	s	a_1 max.	a_2 max.	*)		DIN 94	
			mm					kN	cm²		kg/m
15	14	6	9	14	2	27	33	12,5	1,1	1,6x12	1,2
20	16	8	12	19	3	34	39	25,0	1,8	2,0x14	2,1
25	18	10	15	24	3	37	44	31,5	2,5	2,5x16	2,6
30	20	11	17	28	4	44	50	40,0	3,1	3,2x20	4,0
35	22	12	18	30	4	46	55	50,0	3,7	3,2x20	4,3
40	25	14	20	35	5	53	62	63,0	5,0	4,0x22	6,0
50	35	18	26	44	6	68	80	100,0	8,6	5,0x32	9,0
60	50	22	32	55	8	92	105	160,0	14,6	5,0x32	15,0

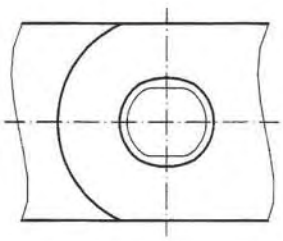
*) If there are cranked links (to be avoided, if possible), calculate with breaking load factor 0.8 only!

Examples for types of pin joints available

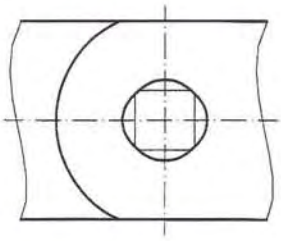
riveted



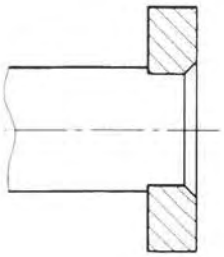
round riveted



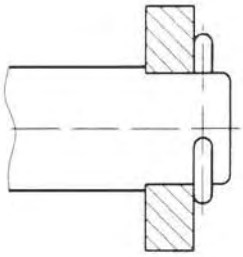
settled



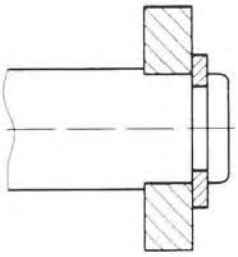
riveted and countersunk



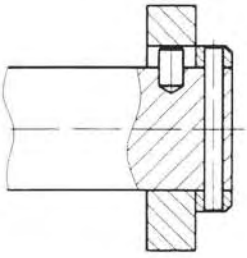
with cotter pin



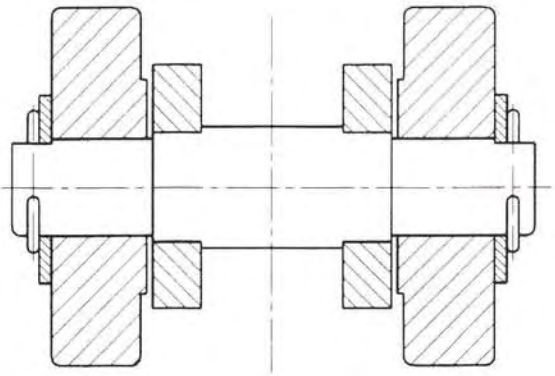
with retaining ring
or circlip



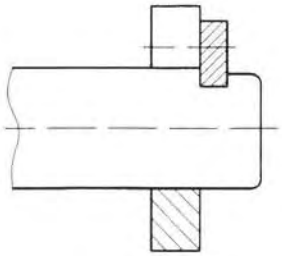
with adjusting ring, adapter sleeve
and locking pin



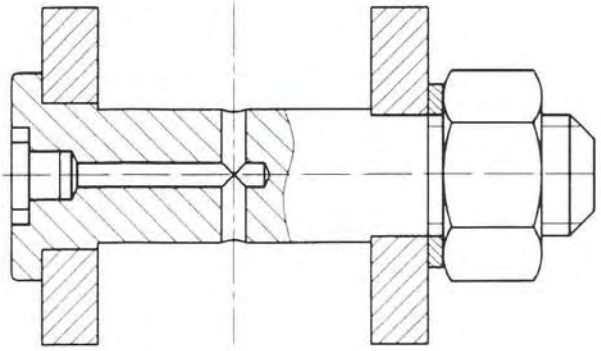
externally running rollers with washer and cotter pin



with axle holder



with nut or castle nut and cotter pin,
grease nipple, grease drilling



7 Illustrations of chain types

Bush conveyor chain with lock nut p=250

Conveyor chain for pipe conveyor p=63

Conveyor chain for round steel conveyor p=80

Conveyor chain with angle bracket p=80

Plate band chain for the automobile industry p=80

Conveyor chain for mine covering p=63

Asphalt chain, scraper chain p=150

Bush conveyor chain p=200

Special chain, measuring table, steel industry p=200

Special chain for plasterboard manufacture p=80

Double-strand hook chain / steel industry p=250

Single-strand hook chain / steel industry p=250

Double-strand chain p=250

Triple plate conveyor p=250

Bush conveyor chain for slaughterhouse p=100

Biplanar chain slaughterhouse p=76,2

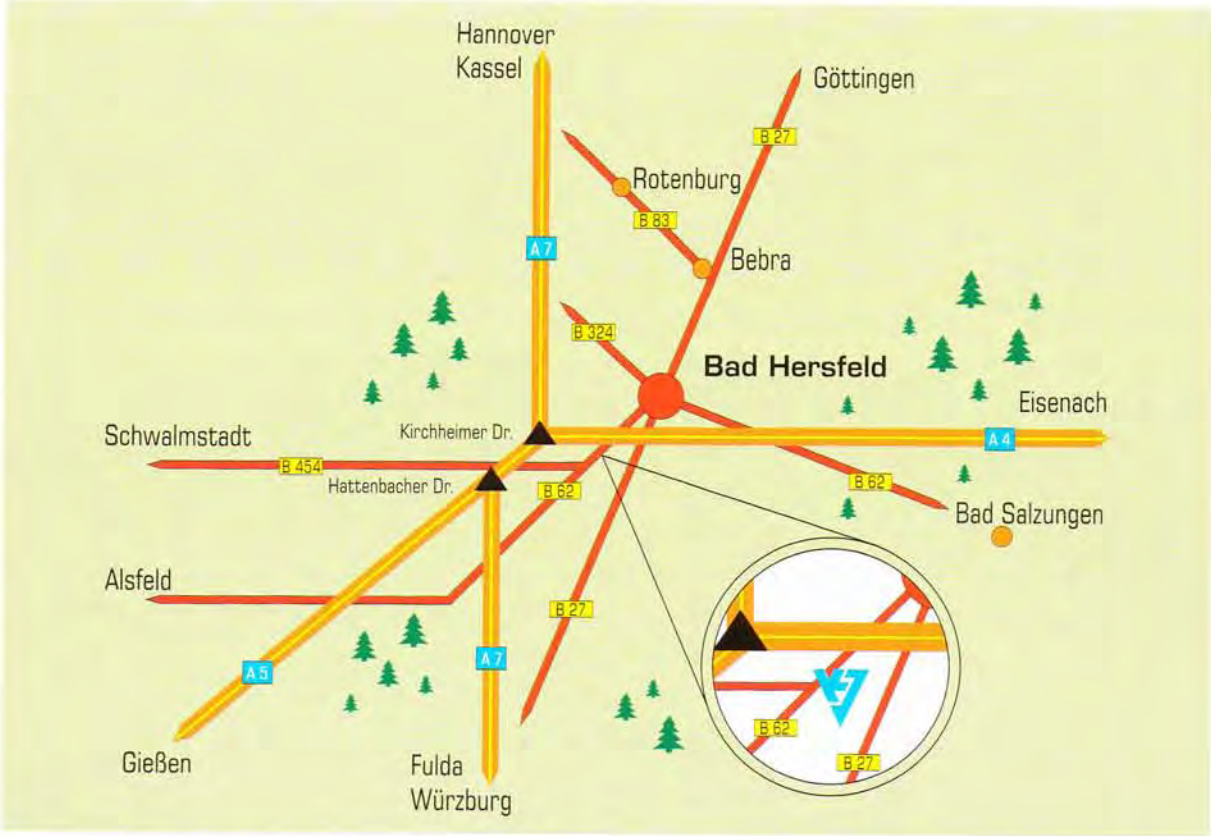
Chain wheel for forked chain z=8; p=142

Chain wheel z=10; p=100

5-fold chain wheel z=25; p=114,3

Pinion shaft z=7; p=210

8 How to find us



Coming from the North / West (A7):
Take the exit Kirchheim, turn right, then right again onto the B 454 heading towards Niederaula. After about 4 km turn left onto the B 62. Follow this road for about 6 km until you come to Bad Hersfeld-Asbach where you will find Alsfelder Strasse 73.

Coming from the South (A7):
Take the exit Niederaula, turn left onto the B 62 towards Niederaula. Follow this road for about 8 km until you reach Bad Hersfeld-Asbach where you will find Alsfelder Strasse 73.

Coming from the East (A4):
Take the exit Bad Hersfeld and go about 2 km towards Bad Hersfeld (B 27). Turn left onto the B 62 signposted Alsfeld. Follow this road for about 1 km after reaching Bad Hersfeld-Asbach you will come to Alsfelder Strasse 73.

9 How to contact us

Please feel free to call us at any time. Alternatively, you can reach us by mail or fax:

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+49-6621-9294-0	+49-6621-9294-10	info@jungbluth-ketten.de

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