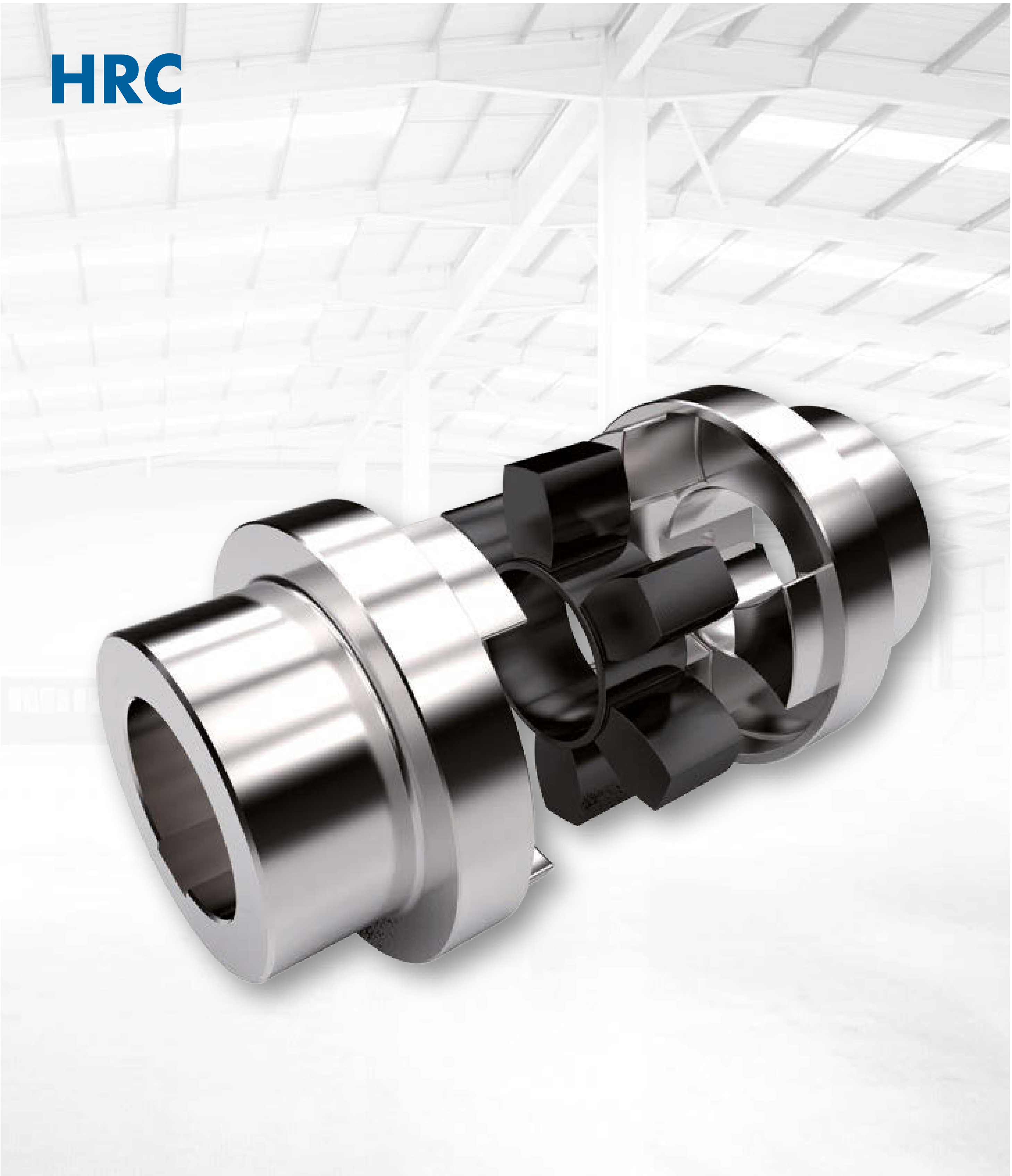
POWER TRANSMISSION

FLEXIBLE COUPLINGS

HRC



HRC

The flexible HRC coupling is a breakthrough safe claw coupling with a flexible element to provide a torsionally flexible connection of shafts. The flexible element, the coupling star, excels in its wear resistance, its oil, ozone and ageing resistance and its temperature resistance from –20 °C to +80 °C. Thanks to the coupling's flexibility, impacts, rotary vibrations and noises are effectively absorbed. The coupling star is dimensioned such that radial and axial movements between the two halves of the coupling are cancelled out. With the fixed position of the coupling star its deformability in axial direction is free, and so no damaging axial forces can act on the machine bearing even with alternating torque. HRC couplings are fail-safe up to the fracture moment of the cast iron transmission cam and this provides maximum operational safety. The coupling is of the plug-in type for installation and does not involve any particularly rigorous requirements with respect to alignment accuracy. The HRC coupling can be used in the whole of machine construction wherever a reliable shaft connection is needed between motor and working machine.

TYPE

- Standard coupling
- Taper bush type
- Combined type standard / taper
- Components can be combined as needed

WITH TAPER BUSH

The HRC coupling combines the outstanding features of the flexible couplings with the advantages of the taper bush system: fast and easy installation for a torsionally flexible connection between shafts and elimination of shaft alignment errors. HRC couplings with taper bush have the advantage that even with greater shaft tolerances there is a backlash-free and at the same time axial fixing of the shaft. In addition the close sliding fit makes axial alignment of the coupling easier. The coupling star can be replaced by a simple axial displacement of the coupling halves without having to disassemble the machines connected.

HRC

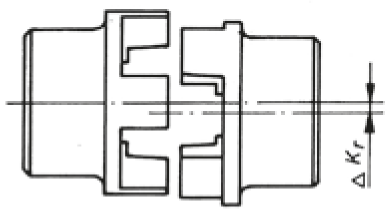
TECHNICAL DATA

Size	Max. rotation rpm	Torque[1) Nm] nominal T_{KN}	Torque[1) Nm] max. T_{kmax}	Torsion spring rigidity Nm/°	Moments of inertia[2)] kgm²	Weight[2)]	Max. shaft misalignment[3)] radial ΔK_r mm	Max. shaft misalignment[3)] axial ΔK_a mm	Max. shaft misalignment[3)] angular ΔK_w degree
70	8100	31	72	–	0.00085	1.00	0.3	+0.2	1
90	6500	80	180	–	0.00115	1.17	0.3	+0.5	1
110	5200	160	360	65	0.00400	5.00	0.3	+0.6	1
130	4100	315	720	130	0.00780	5.46	0.4	+0.8	1
150	3600	600	1500	175	0.01810	7.11	0.4	+0.9	1
180	3000	950	2350	229	0.04340	16.6	0.4	+1.1	1
230	2600	2000	5000	587	0.12068	26.0	0.5	+1.3	1
280	2200	3150	7200	1025	0.44653	50.0	0.5	+1.7	1

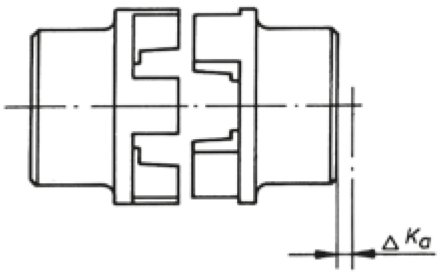
1) Torques for shaft fit with keyway
2) The information concerning weights and moments of inertia apply for medium holes per coupling; coupling half materials: EN-GJL-250 (GG-25) in accordance with DIN EN 1561.
3) The values mentioned are valid for n = 600 rpm and may occur only separately. At multiple misalignments or higher speeds the values must be reduced.

HRC

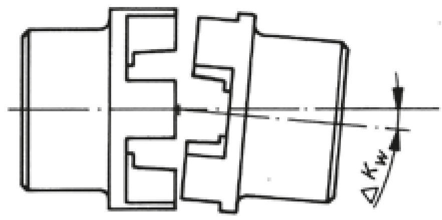
ALLOWABLE MISALIGNMENTS



Radial misalignment



Axial misalignment



Angular misalignment

> Reduction of the allowable values of misalignment when the combination of misalignments occur or at other rotational speeds:

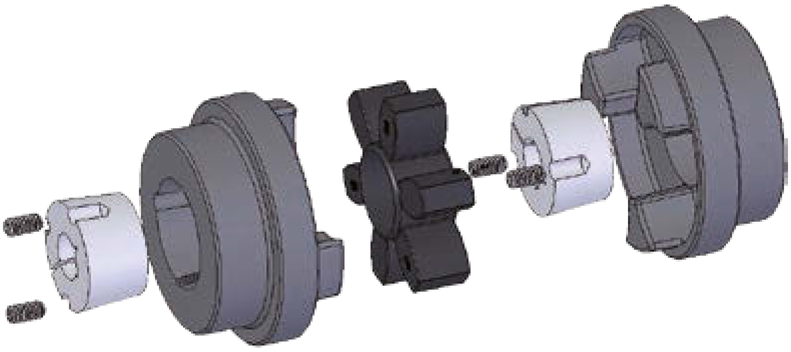
$$\frac{\Delta W_r}{\Delta K_r} + \frac{\Delta W_a}{\Delta K_a} + \frac{\Delta W_w}{\Delta K_w} \leqq 1$$

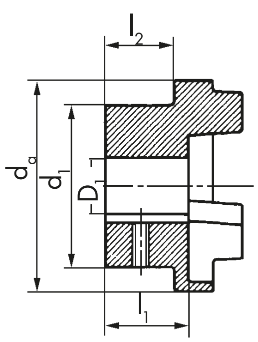
< 1 = applies to speeds of 600 rpm
$\leqq 0.8$ 601 – 1000 rpm
$\leqq 0.65$ 1001 – 1500 rpm
$\leqq 0.50$ 1501 – 3000 rpm

$\Delta K_{r/a/w}$ = allowable radial, axial or angular misalignment of the shafts resp. of the coupling halves

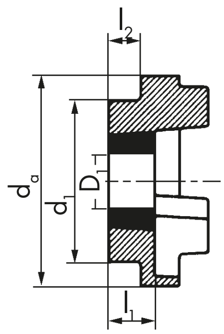
$\Delta W_{r/a/w}$ = measured radial, axial or angular misalignment of the shafts resp. of the coupling halves

HRC FLANGE B, F, H

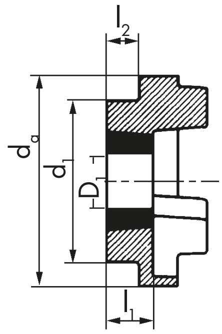




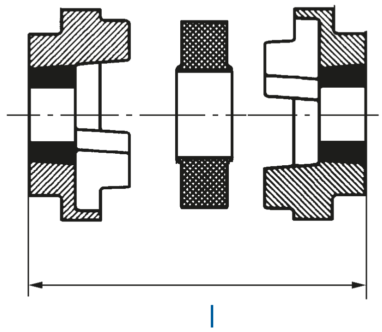
B flange



F flange



H flange



Size	B flange				F and H flange					d_a	d_1	Installation length		
		D_1 (H7)[1]	l_1	l_2		D_1		l_1	l_2			l		
	pre. mm	max. mm	mm	mm	bush	min. mm	max. mm	mm	mm	mm	mm	FF FH HH mm	FB HB mm	BB mm
70	8	32	23.5	20	1008	10	25	23.5	20	69	60	65	65	65
90	10	42	30.0	26	1108	10	25	23.5	19.5	85	70	69.5	76	82.5
110	10	55	45.0	37	1610	14	40	26.5	18.5	112	100	82	100.5	119
130	15	60	47.5	39	1610	14	40	26.5	18.0	130	105	89	118	147
150	20	70	56.0	46	2012	14	50	33.5	23.5	150	115	107	133.5	160
180	25	80	70.0	58	2517	16	60	46.5	34.5	180	125	142	165.5	189
230	25	100	90.0	77	3020	25	75	52.5	39.5	225	155	164.5	202	239.5
280	30	115	105.5	90	3525	35	100	66.5	51.0	275	206	207.5	246.5	285.5

1) Drill holes H7 with keyway in accordance with DIN 6885/1; tolerance zone JS9 and set screws on the keyway

TAPER BUSHES
WITH KEYWAY ACC. TO DIN 6885/1
TOLERANCE JS9

Taper bush no.	Bore ø of available Taper bushes mm											
1008	10	11	12	14	16	18	19	20	22	24	25	
1108	10	11	12	14	16	18	19	20	22	24	25	28*
1610 / 1615	14	16	18	19	20	22	24	25	28	30	32	35
	38	40	42*									
2012	14	16	18	19	20	22	24	25	28	30	32	35
	38	40	42	45	48	50						
2517	16	18	19	20	22	24	25	28	30	32	35	38
	40	42	45	48	50	55	60					
3020	25	28	30	32	35	38	40	42	45	48	50	55
	60	65	70	75								
3525	35	38	40	42	45	48	50	55	60	65	70	75
	80	85	90	95	100							

* These bore holes are with flat keyway in accordance with DIN 6885/3.

HRC

SELECTION

The torque of the machine T_{AN} is determined by: $T_{AN}\ [\mathrm{Nm}] = 9550 \times \frac{P_{Motor}\ [\mathrm{kW}]}{n\ [\mathrm{rpm}]}$

This torque T_{AN} multiplied by a safety factor S depending on the application and the temperature factor S_T (see table page 7) gives the required nominal coupling torque T_{KN}.

Result: $T_{KN} \geqq S \times S_T \times T_{AN}$

> In case that bigger shock or changing loads occur we recommend a revision according to DIN 740. An adequate calculation program is available. For such a revision the following information is required:

1. Kind of the driving machine
2. Kind of the driven machine
3. Power of driving and driven machines
4. Rotational speed of operation
5. Shock loads
6. Exciting loads
7. Moments of inertia of load- and driving sides
8. Starts per hour
9. Ambient temperature

DESIGN EXAMPLE FOR IEC STANDARD MOTORS

Dates of the plant

Driving machine:	
Three-phase motor:	225 M
Power of the motor:	P = 45 kW
Rotation at speed:	n = 1500 rpm
Driven machine:	mixer
Ambient temperature:	+50 °C

$T_{AN}\ [\mathrm{Nm}] = 9550 \times \frac{45\ \mathrm{kW}}{1500\ \mathrm{rpm}} = 287\ \mathrm{Nm}$

$T_{KN} = 1.75 \times 1.5 \times 287\ \mathrm{Nm} = 753\ \mathrm{Nm}$

Selection: HRC size 180

$T_{KN} = 950\ \mathrm{Nm}$

ALLOCATION TO IEC MOTORS

Power P of the IEC motors and allocated HRC couplings									Shaft ends	
	3000 rpm		1500 rpm		1000 rpm		750 rpm		Form E DIN 748 part 3 d x l at speed approx.	
Size of the three-phase motor	P kw	HRC size	P kw	HRC size	P kw	HRC size	P kw	HRC size	3000 rpm	1500 rpm and less
56	0.09 0.12	70 70	0.06 0.09	70 70	0.037 0.045	70 70	–		9 x 20	
63	0.18 0.25	70 70	0.12 0.18	70 70	0.06 0.09	70 70	–		11 x 23	
71	0.37 0.55	70 70	0.25 0.37	70 70	0.18 0.25	70 70	0.09 0.12	70 70	14 x 30	
80	0.75 1.1	70 70	0.55 0.75	70 70	0.37 0.55	70 70	0.18 0.25	70 70	19 x 40	
90 S	1.5	70	1.1	70	0.75	70	0.37	70	24 x 50	
90 L	2.2	70	1.5	70	1.1	70	0.55	70	24 x 50	
100 L	3 –	90	2.2 3	90 90	1.5 –	90	0.75 1.1	90 90	28 x 60	
112 M	4	90	4	90	2.2	90	1.5	90	28 x 60	
132 S	5.5 7.5	110 110	5.5 –	110	3 –	110	2.2 –	110	38 x 80	
132 M	–		7.5 –	110	4 5.5	110 110	3 –	110	38 x 80	
160 M	11 15	130 130	11 –	130	7.5 –	130	4 5.5	130 130	42 x 110	
160 L	18.5	130	15	130	11	130	7.5	130	42 x 110	
180 M	22	130	18.5	130	–		–		48 x 110	
180 L	–		22	130	15	130	11	130	48 x 110	
200 L	30 37	150 150	30 –	150	18.5 22	150 150	15 –	150	55 x 110	
225 S	–		37	150	–		18.5	150	55 x 110	60 x 140
225 M	45	150	45	150	30	150	22	150	55 x 110	60 x 140
250 M	55	150	55	180	37	180	30	180	60 x 140	65 x 140
280 S	75	180	75	230	45	230	37	230	65 x 140	75 x 140
280 M	90	180	90	230	55	230	45	230	65 x 140	75 x 140
315 S	110	180	110	280	75	280	55	280	65 x 140	80 x 170
315 M	132	180	132	280	90	280	75	280	65 x 140	80 x 170
315 L	160 200	230 230	160 200	280 280	110 132	280 280	90 110	280 280	65 x 140	80 x 170
355 L	250 315 –	230 230	250 315 –	280 –	160 200 250	280 – –	132 160 200	– – –	75 x 140	95 x 170
400 L	355 400	280 280	355 400	– –	315 –	–	250 –	–	80 x 170	100 x 210

As proposed in the table for surface cooled three-phase motors with cage rotor acc. to DIN 42673, page1 (data for motor 56, 63, 71, 80, 315 L, 355 L, 400 L, see catalogue Siemens). This allocation is a preliminary selection for normal conditions of operation.
For conditions of operation under shock and changing loads the selection must be made according to the following.

HRC

SAFETY FACTOR S

Assignment of load characteristics according to type of working machine

DREDGERS
- S Bucket conveyor
- S Landing gear (caterpillar)
- M Landing gear (rail)
- M Manoeuvring winches
- M Pumps
- S Impellers
- S Cutter heads
- M Slewing gear

GENERATORS, TRANSFORMERS
- M Frequency transformers
- M Generators
- M Welding generators

CHEMICAL INDUSTRY
- M Cooling drums
- M Mixers
- G Agitators (liquid material)
- M Agitators (semi-liquid material)
- M Drying drums
- G Centrifuges (light)
- M Centrifuges (heavy)

OIL INDUSTRY
- M Pipeline pumps
- S Rotary drilling equipment

CONVEYORS
- M Pit-head winches
- S Winding engines
- M Jointed-band conveyors
- G Belt conveyors (bulk material)
- M Belt conveyors (piece goods)
- M Band pocket conveyors
- M Chain conveyors
- M Circular conveyors
- M Load elevators
- G Bucket conveyors for flour
- M Passenger lifts
- M Plate conveyors
- M Screw conveyors
- M Ballast elevators
- S Inclined hoists
- M Steel belt conveyors
- M Drag chain conveyors

BLOWERS, VENTILATORS
- M Rotary piston blowers
- G Blowers (axial/radial)
- M Cooling tower fans
- M Induced draught fans
- G Turbo blowers

BUILDING MACHINERY
- S Hoists
- G Concrete mixers
- S Road construction machinery

RUBBER MACHINERY
- S Extruders
- M Calenders
- S Kneading mills
- M Mixers
- S Rolling mills

WOOD WORKING MACHINES
- S Barkers
- M Planing machines
- G Wood working machines
- S Saw frames

CRANES
- G Luffing gear block
- S Travelling gear
- G Hoist gear
- M Slewing gear
- M Derricking jib gear

PLASTIC INDUSTRY MACHINES
- M Extruders
- M Calenders
- M Mixers
- M Crushers

METAL WORKING MACHINES
- M Plate bending machines
- S Plate straightening machines
- S Hammers
- S Metal planning machines
- S Presses
- M Shears
- S Forging presses
- S Punch presses
- G Countershafts, line shafts
- M Machine tools (main drives)
- G Machine tools (auxiliary drives)

FOOD INDUSTRY MACHINERY
- G Bottling and container filling machines
- M Kneading machines
- M Mash tubs
- G Packaging machines
- M Cane crushers
- M Cane cutters
- S Cane mills
- M Sugar beet cutters
- M Sugar beet washing machines

PAPER MACHINES
- S Couches
- S Glazing cylinders
- M Pulper
- S Pulp grinders
- M Calenders
- S Wet presses
- S Willows
- S Suction presses
- S Suction rolls
- S Drying cylinders

PUMPS
- S Piston pumps
- G Centrifugal pumps (light liquids)
- M Centrifugal pumps (viscous liquids)
- S Plunger pumps
- S Press pumps

STONE AND CLAY WORKING MACHINES
- S Crusher
- S Rotary ovens
- S Hammer mills
- S Ball mills
- S Tube mills
- S Beater mills
- S Brick presses

TEXTILE MACHINES
- M Batchers
- M Printing and dyeing machines
- M Tanning vats
- M Willows
- M Looms

COMPRESSORS
- S Piston compressors
- M Turbo compressors

METAL ROLLING MILLS
- S Plate shears
- M Manipulator for turning sheets
- S Ingot pushers
- S Ingot and slabbing-mill train
- S Ingot handling machinery
- M Wire drawing benches
- S Descaling machines
- S Thin plate mills
- S Heavy and medium plate mills
- M Winding machines (strip and wire)
- S Cold rolling mills
- M Chain tractor
- S Billet shears
- M Cooling beds
- M Cross tractor
- M Roller tables (light)
- S Roller tables (heavy)
- M Roller straighteners
- S Tube welding machines
- M Trimming shears
- S Cropping shears
- S Continuous casting plant
- M Rollers adjustment drive
- S Manipulators

LAUNDRIES
- M Tumblers
- M Washing machines

WATER TREATMENT
- M Aerators
- M Screw pumps

Operating factor S			
Driving machines	Load characteristics of the working machine		
	G	M	S
Electric motors, turbines, hydraulic motors	1	1.75	2.5
Piston machines 4–6 cylinders, degree of nonuniformity 1:100 – 1:200	1.5	2.5	3.5
Piston machines 1–3 cylinders, degree of nonuniformity up to 1:100	2	3	4

Temperature factor S_T	
ϑ [°C]	S_T
$-20 < \vartheta < +30$	1.0
$+30 < \vartheta < +40$	1.2
$+40 < \vartheta < +60$	1.5
$+60 < \vartheta < +80$	1.8

HRC