INTER PLANT STANDARD IN STEEL INDUSTRY		
IPSS	**CODE OF PRACTICE FOR SELECTION OF COUPLINGS**	**IPSS:1-01-007-18 (Second Revision)**
		Formerly : IPSS:1-01-006-86 (First Revision)

0. FOREWORD

0.1 Interplant standardization in steel industry has been initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). The Interplant Standards prepared by the standard committee on Mechanical Drives, IPSS 1:1, with the active participation of the representatives of all the steel plants and leading consultants and was originally adopted in 1983 and revised with first revision in March, 1986. Thereafter, this standard revised with second revision in **November, 2018**.

0.2 Interplant standardization for steel industry primarily aims at achieving rationalization and unification of parts and sub-assemblies used in steel plants equipments and accessories and provides guidance in indenting stores or equipment for existing or new installations by individual steel plants. For exercising effective control on the inventories, it is advisable to select a fewer number of sizes (or type) from among the products mentioned in this standards for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

0.3 This revision is an updated version to take care of the guidelines on the selection of couplings.

1. SCOPE

1.1 This Inter Plant Standard covers the procedure for the selection of type of couplings and its size.

2. Basic Information

2.1 For selecting a coupling, the following information shall be collected in the first in the first instance:

a) Type of prime mover;

b) Speed of coupling in rev/ min;

c) Type of driven machine;

d) The rated output in KW of the prime mover;

e) Type of operation, that is, whether even or uneven operation, shock load, etc (see Table-1);

f) Average daily operating period in hours (see Table 2)

g) Number of Operations per hour (see Table 3)

h) Type of couplings (see Table -4)

3. Factors of Safety

The minimum factor of safety for the type of duty (duty factor, f_1) the minimum factor of safety for the daily duration of operation (daily duration of operation factor f_2) and the

minimum factor of safety for the frequency of operations (starts) per hour (factor, f3) shall be selected from Tables 1, 2 and 3 respectively.

4. **Calculation of Nominal and specific Output of Coupling**

The nominal output of the coupling (N_n) shall be calculated using the following formula:

$N_n = N (f_1 \times f_2 \times f_3)$

Where N is the rated output in KW of the prime mover.

The output in KW per 100 rev/ min (N_a) shall be calculated using the following formula:

$$N_a = \frac{(N_n \times 100)}{n}$$

Where n is the speed of rotation of the prime mover.

For example, the size of the coupling required for the following known parameters is to be calculated;

a) Type of prime mover = electric motor

b) Speed of coupling = 1450 rev/min

c) Type of driven machine = belt conveyor

d) Rated output of the prime mover = 7.5 KW

e) Average daily operating period = 8 hours

f) Type of duty = uneven running and medium mass acceleration

g) Number of Operations = 30 starts / hour

$N_n = N (f_1 \times f_2 \times f_3) = 7.5 (1.4 \times 1 \times 1.17) = 12.3$ KW

f_1 = 1.4 [see Sl No. (iii) in Table 1]

f_2 = 1 (see Table 2)

f_3 =1.17 (see C in Table – 3)

$$N_a = \frac{(N_n \times 100)}{N} = \frac{12.3 \times 100}{1450}$$

Hence the actual output of the coupling shall be 0.85 KW.

TABLE 1 MINIMUM FACTOR OF SAFETY (f_1) DEPENDING ON TYPE OF DUTY (WITH ELECTRIC MOTORS OR STEAM TURBINES PRIME MOVERS)

(*Clauses* 2, 3 *and* 4)

Sl No.	Type of Duty	Example of Driven Machines	f_1
i)	With steady running and very slight mass acceleration	Centrifugal pumps for liquid materials, fans of $N_1 n = 0{\cdot}05$, dynamos	1·0
ii)	With steady running and slight mass acceleration	Sheet metal bending machines, elevators, exhausters of $N_1 n = 0{\cdot}05$ to $0{\cdot}1$, conveyor and elevator belts for bulk materials, rotary blowers and compressors, fans of $N_1 n = 0{\cdot}05$ to $0{\cdot}1$, machine tools with rotary action, etc	1·2
iii)	With uneven running and medium mass acceleration	Rotary piston blowers, rotary ovens conveyors belts for piece goods, conveyor drums, generators, wood working machines, centrifugal pumps for semi-liquid materials mixers, agitators for semi-liquid materials, grinding machines, vibratory screens, fans of $N_1 n = 0{\cdot}1$, winches, plate conveyors, etc	1·4
iv)	With uneven running, medium mass acceleration and shock loads	Concrete mixers, drop hammers, overhead cranes, chain conveyors, reciprocating pumps and compressors with a coefficient of cyclic variation from 1:100 to 1:2 000 crane installation, ball mills, pressure pumps, rotary screws, rope winches, roller frames, centrigauges, wire drawing benches, hammer mills and punches	1·7
v)	With uneven running, high mass acceleration and very heavy shock loads	Hammers, reciprocating pumps with a light flywheel, presses, rotary drilling equipment, shears, forging presses	2·0
vi)	With uneven running, very high mass acceleration and very heavy loads	Reciprocating compressors and reciprocating pumps without flywheel, heavy rolling mills, welding generators, brick presses, etc	2·4

5. **Reference to other standards**

Reference to the coupling rating given in

a) IPSS: 1-01-003-18 ‘ Specification for tyre type flexible couplings’

b) IPSS: 1-01-005-18 ‘ Specification of Gear Type Flexible couplings,

c) IPSS: 1-01-006-18 ‘Specification for Grid Type Resilient Couplings ‘

shall be made to select a coupling with a rating equal to or more than obtained according to point - 4.

6. **Bore of the coupling**

The shaft diameter on which the coupling is to be fitted shall be less or equal to the specified maximum permissible bore of the coupling. If the shaft diameter is larger, appropriate higher size of the coupling shall be selected.

7. **Caution**

The coupling shall not be used for an application, where the rotational speed is higher than the specified maximum permissible speed given in the interplant standards. For such applications, it shall be treated as a special case.

TABLE – 2

MINIMUM FACTOR OF SAFETY THE DAILY DURATION OF OPERATION FACTOR, f_2

(Clause 2, 3 and 4)

S. NO.	DAILY OPERATIING PERIOD (hours)	FACTOR (f_2)
1	Up to 8 hours	1.0
2	Above 8 upto 16 hours	1.12
3	Above 16 hours	1.25

TABLE-3

MINIMUM FACTOR OF SAFETY THE FREQUENCY OF START FACTOR, f_3

(Clause 2, 3 and 4)

No. of Operations (Starts) per Hour							
	Above	—	1	20	40	80	160
	Up to	1	20	40	80	160	—
Type of Duty		f_3					
	A	1	1·2	1·3	1·5	1·6	2·0
	B	1	1·09	1·18	1·37	1·46	1·8
	C	1	1·08	1·17	1·25	1·33	1·65
	D	1	1·07	1·15	1·23	1·23	1·55
	E	1	1·07	1·12	1·18	1·18	1·32
	F	1	1·06	1·08	1·1	1·1	1·1

TABLE 4 GUIDELINES FOR SELECTION OF GEAR, GRID, TYRE AND BUSH PIN TYPE COUPLINGS

[*Clause* 2 (h)]

Sl No.	Type of Loading	Preferred Type of Coupling			Examples
		First Preference	Second Preference	Third Preference	
i)	Uni-directional, constant speed, even torque, continuous running	Bush-pin	Tyre	Gear or grid	Blower, centrifugal pumps, conveyors with uniform loading, fans, generators (light duty), etc
ii)	Intermittent running frequent starts and stops, heavy load	Gear Gear or Grid	— Bush Pin	— —	a) EOT cranes b) Compressors, rolling mill drives, elevators, hoists, reciprocating pumps, rotary kilns, grinders, shears, mixers, hammer mills, etc
iii)	Reversible drives and high speed drives	Gear or Grid	Bush pin	Tyre	Roller table drives, furnace tilting, mixer drives, boosters, etc
iv)	Where end float, parallel and angular misalignments are unavoidable	Tyre	Gear	—	Cover carriage, or places where end float of the shaft is present
v)	For a smooth start and where starting torque is high, and sudden stoppage of driven machine occurs	Fluid	—	—	Conveyors, furnace door operation, agitators, stripper cranes, etc
vi)	Where misalignment does not exist, and long shafts are to be connected	Rigid	—	—	EOT cranes, equalizer shafts, line shafts of roller tables, etc