INTER PLANT STANDARD – STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR BELT SPEED RELAYS AND TRANSDUCERS (*First Revision*)**	**IPSS:1-04-018-06**
	Corresponding IS does not exist	Formerly: IPSS:1-04-018-89

0. FOREWORD

0.1 This Interplant Standard prepared by the Standards Committee on Switchgear and Controlgear, IPSS 1:4, with active participation of the representatives of all the steel plants and established manufacturers of Relays and Transducers, was adopted in July 2006.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of parts and assemblies used in steel plant equipment and accessories, and provide guidance in indenting stores of equipment (or while placing orders for additional requirements) by individual steel plants. For exercising effective control on inventories, it is advisable to select a fewer number of sizes (or types) from among those mentioned in this standard, for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

0.3 This Interplant Standard covers belt speed relays and transducers working on digital counting principle. The other types, namely mechanical type (centrifugal type belt slip switch), and analog type, which work together with techo generator type transducer, have not been covered in this Standard.

0.4 The belt speed relays covered in this standard are also sometimes called `Speed control relays' or `Speed monitor relays'.

0.5 Certain modifications have been incorporated in this revision based on shop floor experiences.

1. SCOPE

This Interplant Standard covers belt speed relays together with transducer intended for monitoring the speed of belt conveyors and to protect the same from slippage and cross rupture. The system should provide for the following regimes:

a) Time delayed by-pass contact during switching on of the conveyor;

b) Checking and monitoring of belt movement, speed, slip and transverse belt damage;

c) Automatic stoppage of the conveyor drive at fault regimes that take place because of belt slippage or transverse belt damage. The normal speed of the conveyor ranges up to 4 m/s and the belt speed relay should be designed to operate at any percentage speed drop of the conveyor; and

d) Provide delay time for switching off after disappearing of the signal from the transducer.

2. SITE CONDITIONS

2.1 The transducer is located by the side of the snub pulley or the tail end pulley, or the ladling roller of conveyor wherein the atmosphere is very dusty with current conducting dust.

2.2 The relay and the transducer shall be located in a place having a fair amount of dust.

2.3 The reference ambient temperature shall be 55^{o}C.

2.4 The maximum relative humidity is 100 percent which is not likely to occur simultaneously with the maximum ambient temperature.

3. PRINCIPAL OF OPERATION

3.1 The operation of the belt speed relay shall be based on digital pulse counting principal.

3.2 The transducer (preferably induction type) of contactless design shall be mounted with a transducer gap of 5 to 50 mm.

3.3 The monitor shall operate on the principle of counting the pulses received from the transducer against a time base and comparing it with the speed setting of the monitor. When the belt slips, the reduction in pulse rate below the setting shall actuate the output relay in the monitoring unit after the adjustable preset nuisance tripping delay.

3.4 During the starting of the equipment, the output relay shall remain de-energized as long as the actual speed is below the set value. The control circuit shall incorporate initial time delay by-pass contact. This may be achieved externally by using a suitable motorized/electronic solid state/pneumatic time delay relay. Alternatively, the monitoring unit may be provided with a built-in adjustable time delay by pass circuit.

3.5 The healthiness of the relay circuit at normal speed of the conveyor shall be indicated by means of an LED which may be made to blink through appropriate circuitry.

3.6 There shall be provision to check the healthiness of the circuit when the conveyor does not run through appropriate circuits operated through a push button provided for testing purposes.

The transducer shall be provided with an LED blinking in correspondence with the pulses to indicate its healthiness. It shall also be possible to check the healthiness of the monitoring unit by feeding appropriate pulse signals.

4. RATINGS AND LIMITS OF OPERATION

4.1 The transducer output shall be of adequate strength to transmit pulses when situated at the declared/recommended gap to the monitoring unit located at a distance of about 500m without amplifier.

4.2 The slots on the snub pulley of the conveyor shall be such that the transducer generates 1 pulse/sec during the normal speed of the conveyor. The rated frequency range of the transducer shall be 0.3 to 1 Hz for a speed variation of 0.6 to 3.5 m/s of the conveyor belt.

4.3 The preferred rated supply voltages shall be 240 V, 50 Hz with permitted voltage variation +10 / -15 percent.

4.4 The output relay shall have two sets of 2 NO, 2 NC contacts arrangement. The relay shall have silver sodium oxide contacts, rated for not less than 6 A, 230 V, 50 Hz for a rated duty of ac-15 [see 4.4 of IS 13947 (Part 1) `Specification for control switches (switching devices for control and auxiliary circuits including contractor relays) for voltages up to and including 1000 V and 1200 V dc : Part 1 General requirements and tests].

4.5 The actuation differential (the difference between `switch-on' and `switch-off' speed values of the output relay) shall not be more than 5 percent.

4.6 It shall be possible to set the switch to reactuate at a speed within $\pm$ 2.5 percent of the desired value.

4.7 The actuation of the switch for a given setting shall have repeat accuracy within $\pm$ 1 percent of the set value.

5. CONSTRUCTION

5.1 The magneto inductive device shall be mounted in an epoxy moulded non-magnetic housing.

5.2 Terminal studs of brass should be provided at the rear side for connecting output leads from the transducer.

5.3 The speed relay consisting of the control components, the power supply unit and output relay shall be suitable for surface mounting. the relay shall be enclosed in a casing which shall be robust elegant and made of unbreakable synthetic/metallic material and provided with neoprene gasket to prevent dust entry. The degree of protection for both relay and transducer shall be IP64. The enclosure shall be as per IP 54/55.

5.4 The location of individual components shall depend on the design of PCBs but toggle switches push buttons, Neon lamp and LED shall be mounted on the front cover.

5.5 The output relay shall be enclosed in an individual dust proof cover and shall be socket mounted, the socket being firmly fixed within the enclosure of the speed relays.

5.6 All the components used in the monitor circuit should be of industrial duty.

5.7 Final assembly shall be coated with non-hygroscopic insulating varnish.

5.8 All fuses shall be of glass cartridge type and shall be easily accessible.

6. MARKING

6.1 The transducer and belt speed relay shall be marked with the following information:

a) Manufacturer's name or trade-mark or both.

b) Month and year of manufacture,

c) Rated supply voltage,

d) Manufacturer's type reference and serial number, and

e) Designation of this standard.

f) Contact rating of output relay.

g) Contact configuration of output relay.

6.2 All the relevant technical details of the transducer and the speed relay shall be given in a separate leaflet and which shall include the following details:

a) Overall dimensions and mounting details of transducer and speed relay;

b) Schematic diagram of the speed relay; and

c) Makes, types and ratings of individual components like output relay, push button, Neon Pilot lamps, Toggle switches, ICs and other electronic components.

7. TESTS

Each transducer and relay shall be tested for conformity with all relevant clauses of this standard.

Back