INTER PLANT STANDARD – STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR PNEUMATIC TIME DELAY RELAYS FOR ac & dc APPLICATION (*Second Revision*)**	**IPSS:1-04-011-11**
	Based on IS 5834 (Part 1):1994	Formerly: IPSS:1-04-011-99

0. FOREWORD

0.1 This Interplant Standard has been prepared by the Standards Committee on Switchgears and Controlgears, IPSS 1:4, with the active participation of the representatives of the steel plants, major consulting organizations and established manufacturers of relays and was adopted in March 2011.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of parts and sub-assemblies used in steel plant equipment and accessories, and provide guidance in indenting stores or equipment for existing or new installations 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.

1. SCOPE

1.1 This Interplant Standard covers the performance requirements of electro-pneumatic time delay relays employed in steel plants for providing quick, dependable and steplessly adjustable time delay for delaying the closing or opening of the control circuits and is generally based on IS 5834 (Part 1):1994 Electrical timer relays for industrial purposes: Part 1 Pneumatic (first revision)'.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS 1885 (Part 9):1992 `Electrotechnical Vocabulary: Part 9 Electrical relays (first revision)' and IS 5834 (Part 1):1994 shall apply.

3. SERVICE CONDITIONS

3.1 The following shall constitute the normal site conditions for the purpose of this standard:

a) *Ambient temperature* - The reference ambient temperature shall be 40°C;

b) *Altitude* - The altitude shall not exceed 1000 m;

c) *Humidity* - The maximum relative humidity shall be 100%. However, both maximum temperature and 100% relative humidity may not occur simultaneously.

3.2 The relay shall be suitable for mounting without any enclosure and shall operate satisfactorily in an industrial atmosphere. (For special application, the customer shall specify the enclosure required).

3.3 The relay shall be suitable for service on EOT cranes, transfer cars and such other mobile equipment with normal vibrations, and shall be able to withstand vertical impact 2g, and horizontal impact 1g.

3.4 The relay shall function reliably up to a maximum ambient temperature of 50°C.

4. DESIGN AND CONSTRUCTION

4.1 The pneumatic timer operation shall be based on a diaphragm and internal air circulation system so that their accuracy is maintained even in dirty and adverse environmental conditions. The duration of timing cycle depends on the rate of air travel through an adjustable timing orifice which shall be controlled from outside.

4.2 The time delay relay shall be simple and strong in construction for a trouble-free and long service life. The timing head bracket shall be sufficiently rigid to completely eliminate any bending with respect to the base in order to avoid blocked plunger movement and timing stalled. Parts which may require replacement, shall be readily accessible and replaceable.

4.3 The time delay relays shall be available in the following three types:

a) On delay or off delay with timed contacts only;

b) On delay or off delay with timed contacts and additionally instantaneous contacts; and

c) On delay and off delay with timed contacts.

4.4 **Terminals** - The terminals of the relay shall be of adequate size to accommodate at least two numbers of 2.5 mm cables (solid or stranded conductors).

4.5 **Contacts**

4.5.1 The number of contacts for timed contacts as well as instantaneous contacts shall be 2 NO+2 NC, which may be either single or double-break.

4.5.2 The contact tips shall be of silver or silver based alloy to ensure long electrical and mechanical life. Contacts shall be completely enclosed to prevent ingress of dust and other such matter.

4.5.3 The relay shall be "field-convertible" that is, it shall be possible to convert on the job from ON delay to OFF delay or vice-versa without involving extra parts, adjustment or rewiring.

4.6 The dc coils shall be continuously rated (part winding or economy resistor design shall not be acceptable).

5. RATINGS

5.1 Coil Ratings

5.1.1 *Rated coil voltages* - The rated coil voltages shall be one of the following values:

For ac: 110, 250 and 433 V, 50 Hz.
For dc: 24, 48, 110 and 220 V.

5.1.2 The coils shall be designed to withstand wide fluctuations in voltage and frequency and shall operate reliably within voltage tolerance limits of +10 to -15 % of the rated voltage and frequency tolerance limits of +3 to -6 % of the standard frequency (in the case of ac coils).

5.1.3 The coils shall be of Class B or Class F insulation.

5.2 Contact Ratings

5.2.1 *Rated contact circuit voltage* - The rated contact circuit voltage shall be one of the following:

For ac: 110, 250 and 433 V, 50 Hz.
For dc: 24, 48, 110 and 220 V.

5.2.2 *Preferred rated currents*

5.2.2.1 The preferred rated operational currents shall be 6 A ac/0.5 A dc.

5.2.2.2 The preferred rated thermal currents shall be 10 A.

5.2.3 *Utilization categories* - The contacts shall be suitable for the utilization categories ac-11 and dc-11 [see 4.4 of IS 13947 (Part 5/Sec 1):1993 `Specification for low voltage switchgear & controlgear: Part 5 Control circuit devices and switching

elements, Sec 1 Electromechanical control circuit devices superseding IS 6875 (all parts) (amendment 1)'.

6. RATED TIME SETTING RANGE

6.1 The time delay relay shall be provided with a suitable mechanism for stepless time delay adjustment in the following ranges:

a) 0 - 5 s,
b) 0 - 30 s,
c) 0 - 60 s, and
d) 0 -180 s.

NOTE: The value `0' in the above ranges also covers the unintentional time delay, limited to 5% of the highest time delay in the range.

7. OPERATING CHARACTERISTICS AND ACCURACY

7.1 **Rated Resetting Time** - The relay shall be suitable for high speed operations and the rated resetting time of the relay shall not be more than 0.04 s.

7.2 **Repeat Accuracy** - The repeat accuracy of relay operating time shall be within 10% [see 3.17 and 9.7 of IS 5834 (Part 1):1994].

7.3 **Rated Switching Frequency** - The rated switching frequency of the relay shall be 1200 operations per hour.

8. MECHANICAL ENDURANCE

8.1 The time delay relay shall be capable of operating at least 10x10 times at the rated switching frequency with the contacts under no-load conditions without any mechanical failure.

9. ELECTRICAL ENDURANCE

9.1 The contacts of the relay shall be capable of making and breaking the currents specified under test conditions for load operation corresponding to IS 13947 (Part 5/Sec 1):1993 at the rated switching frequency.

NOTE: dc test shall be conducted as per 8.3.3.5.3 & 8.3.4.2 of IS 13947 (Part 5/Sec 1):1993. Test circuit and figure as per IS are enclosed.

9.2 The minimum number of operations shall be $1x10^6$ times.

10. RATED MAKING AND BREAKING CAPACITY

10.1 The contacts of the relay shall be capable of making and breaking the currents specified under test conditions for rated making and breaking capacity corresponding to the utilization categories as per 4.4 of IS 13947 (Part 5/Sec 1):1993.

11. MARKING

11.1 The following information shall be marked distinctly and permanently on the name-plate of every relay which shall preferably be affixed to the relay in such a position where the markings are visible and legible when the relay is installed:

a) Manufacturer's name,
b) Manufacturer's type reference,
c) Rated coil voltage ac/dc,
d) Rated contact circuit voltage,
e) Rated operational current of the contact ac/dc,
f) Rated time setting range,
g) Reference to this IPSS, i.e. IPSS:1-04-011-11

11.2 All the technical details of the relay shall be given in a separate leaflet which shall include the following details:

a) Overall dimension and mounting details,
b) List of all components with parts numbered,
c) Operating instruments,
d) Procedure for maintenance, overhauling and reassembly,
e) Storage and periodicity of checking when in use, and
f) Weight of the relay.

12. TESTS

12.1 The tests shall be carried out in accordance with IS 5834 (Part 1):1994. However, for the following type tests, relevant provisions of corresponding tests in conformity with 8.1.2 of IS 13947 (Part 5/Sec 1): 1993 are also applicable:

a) Verification of mechanical endurance (Sub-clause 8.2);
b) Verification of electrical endurance (8.3.3.5.3);
c) Verification of rated making and breaking capacity (8.3.3.5.2); and
d) Temperature rise test (Sub-clause 8.3.3.3)

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