INTER PLANT STANDARD - STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR MOTORIZED TIME DELAY RELAYS FOR ac & dc APPLICATION** (*First Revision*) Based on IS 5834 (Part 2):1993	**IPSS:1-04-009-99** Formerly: IPSS:1-04-009-84

0. FOREWORD

0.1 This Interplant Standard has been prepared by the Standards Committee on Switchgear and Controlgear, 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 1999.

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 motorized time delay relays employed in steel plants for providing steplessly adjustable time delay for delaying the closing or opening of the control circuits and is generally based on IS 5834 (Part 2):1993 `Electrical timer relays for industrial purposes: Part 2 Motorized (*first revision*)'

NOTE: For convenience of reference, clause numbers of this Indian Standard for each requirement are given in **Appendix-A** along with the numbers of matching clauses of this standard, any supplementary clauses or deviations from ISs (essential/desirable), requirements selected for steel plant use out of choice given in ISs.

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 2):1993 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) *Ambient air* - The ambient air may contain fair amount of conductive dust; and

d) *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 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.

3.3 The relay shall function reliably up to a maximum ambient temperature of $50^{o}C$.

4. DESIGN AND CONSTRUCTION

4.1 The time delay relays shall be made of standard materials suitable for use under service coditions specified in 3 above.

4.2 Enclosures

4.2.1 The time delay relays shall be housed in an enclosure which shall be dust and moisture-proof, with proper sealing. Enclosure shall be transparent where time delay settings are displayed and it shall not turn opaque with long continuous use in the steel plant environment.

4.2.2 The cover shall be fixed on to the main body easily either by the use of clamps or screws. If screws are used, these shall be such that they remain attached to the cover even when the cover is removed.

4.2.3 The enclosure shall be such that when it is opened, the terminals are easily accessible in cases where the terminals are accommodated inside the enclosure.

4.2.4 The covers shall be such as to permit enough space in the interior of the enclosure for accommodating the internal conductors from their point of entry into the enclosure up to the terminals.

4.2.5 The cover of the protective enclosure shall be so secured to its base that it cannot be accidentally loosened or detached owing to the effects of operation of the relay.

4.2.6 Metallic enclosures shall have provision for two earthings. Degree of protection shall be IP 51 conforming to 7.1.10 & 7.1.11 of IS 13947 (Part 1):1993 `Low-voltage switchgear and controlgear: Part 1 General rules (*superseding IS 4237*)'.

4.3 Terminals

4.3.1 The terminals of the relays shall be of adequate size to accommodate at least two numbers of 2.5 mm^2 cables (solid or stranded conductors).

4.3.2 All terminals should be distinctly marked with reference to functions.

4.4 Contacts

4.4.1 Time delay relay shall have eight contacts (4 NO + 4 NC) with the provision for field conversion.

4.4.2 The contacts shall be of silver or silver based alloy to ensure long electrical and mechanical life.

4.5 Other design and constructional features like means of time delay setting, general operating principle and type of drive shall be in conformity with IS 5834 (Part 2):1993.

5. RATINGS

5.1 Motor Ratings

5.1.1 Rated motor circuit voltage shall be one of the following values:

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

5.1.2 The motors 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 frequncy (in the case of ac motors). The motors shall be continuously rated to withstand stalled conditions, if any, encountered during its operation.

5.2 Contact Ratings

5.2.1 Rated contact circuit voltage - The rated contact circuit voltage shall be 110, 250 & 433 V ac or 24, 48, 110 and 220 V dc.

5.2.2 Preferred rated currents

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

5.2.2.2 The preferred rated thermal currents shall be 10A.

5.2.3 Utilization category - The contacts shall be suitable for the utilization categories ac-14 and dc-14 conforming to 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 Relay shall be provided with a suitable mechanism for stepless time delay adjustment in the following ranges, each range having 60 intermediate divisions:

a) 0 - 60 s,
b) 0 - 6 min,
c) 0 - 30 min,
d) 0 - 60 min,
e) 0 - 12 h, and
f) 0 - 24 h

NOTE: The value `0' in the above ranges also covers unintentional time delay not exceeding 5% of the maximum of the range.

7. OPERATING CHARACTERISTICS AND ACCURACY

7.1 **Rated Resetting Time** - In case of self-resetting type time delay relays, the rated resetting time of the relay shall not be more than 0.30 s.

7.2 **Repeat Accuracy** - The relay shall have a repeat accuracy of ±5%.

7.3 **Rated Switching Frequency** - The rated switching frequency of the relay shall be 1000 operations per hour.

8. MECHANICAL ENDURANCE

8.1 The time delay relay shall be capable of operating at least 10×10^6 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 the test conditions for load operation corresponding to 7.2.4 of 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 and 8.3.4.2 of IS 13947 (Part 5/Sec 1):1993. Test circuit and figure as per IS are enclosed.

The minimum number of operations shall be 0.5×10^6 times.

10. RATED MAKING AND BREAKING CAPACITY

10.1 The contacts of the relay shall be capable of making and breaking currents specified under test conditions for rated making and breaking capacity corresponding to the utlization categories as per 4.4 of IS 13947 (Part 5/Sec 1):1993. This test shall be carried out according to 8.3.1 of IS 13947 (Part 5/Sec 1):1993.

The minimum number of operations shall be 1000.

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 motor circuit voltage ac/dc;
d) Rated contact circuit voltage;
e) Rated operational current of the contact ac/dc;
f) Rated time setting range;
g) Serial number/year of manufacture; and
h) Reference to this IPSS, i.e. IPSS:1-04-009-99.
i) No. of contacts: NO, NC

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

a) Overall dimensions and mounting details;
b) List of all components with parts numbered;
c) Operating instructions and procedure for adjustment of time delay, etc;
d) Procedure for maintenance, overhauling, reassembly, etc;

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 2):1993. However, for the following type tests, relevant provisions of corresponding tests as per 8.1.2 of IS 13947 (Part 5/Sec 1):1993 shall also be 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);
d) Temperature rise test (8.3.3.3)

APPENDIX-A (Sheet 1 of 2)
(Clause 1)

COMPARATIVE STUDY OF IPSS:1-04-009-99 'SPECIFICATION FOR MOTORIZED TIME DELAY RELAYS FOR ac AND dc APPLICATION (*first revision*)' AND IS 5834 (PART 2):1993 'ELECTRICAL TIMER RELAYS FOR INDUSTRIAL PURPOSES: PART 2 MOTORIZED (*first revision*)'

	Requirements	Clause Reference in IPSS	Clause Reference in IS
Requirements which are identical between IPSS & IS	Terminology	2	3
	Reference ambient temperature	3.1(a)	7.1(a)
	Altitude	3.1(b)	7.1(e)
	Material of construction	4.1	4.1.1
	Means of time delay setting, general operating principle, type of drive	4.5	4.5, 4.6 4.7
	Rated frequency	5.1.1	5.5
	Rated Switching frequency	7.3	5.8
Requirements selected for steel plant's use out of choices given in IS	Enclosure earthing	4.2.6	4.2.4
	Rated contact circuit voltage, dc	5.2.1	5.2

APPENDIX-A (Sheet 2 of 2)

	Requirements	Clause Reference in IPSS	Clause Reference in IS
Supplementary requirements not contradicting IS	Humidity	3.1(d)	
	Degree of protection of enclosure	4.2.1, 4.2.6	4.2.1
	Enclosure construction	4.2.1, 4.2.2 4.2.3, 4.2.4, 4.2.5	4.2.2 4.2.3
	Terminal size	4.3.1	4.3.1
	Terminal marking	4.3.2	-
	Contact type and arrangement	4.4.1	4.4
	Material of contacts	4.4.2	-
	To withstand fluctuations in voltage and frequency and stalled conditions	5.1.2	-
	Rated currents	5.2.2	5.3
	Utilization category	5.2.3	-
	Rated time setting range	[illegible]	5.4
	Repeat accuracy	7.2	-
	Electrical endurance	[illegible]	5.10
	Rated making and breaking capacity	10	5.7
	Marking	11.1	8.1
	Technical leaflet	11.2	-
	Type tests	12	9.0.1
Deviations from IS (essential)	Ambient air	3.1(c)	7.1(f)
	Suitability for service on mobile equipment	3.2	7.1(g)
	Maximum ambient temperature	3.3	7.1(h)
	Rated motor circuit voltage, ac & dc	5.1.1	5.1
	Rated contact circuit voltage, " "	5.2.1	5.2
	Mechanical endurance	[illegible]	5.9
Deviations from IS (desirable)	Rated resetting time	7.1	5.6

IS 13947 (PART 5/SEC 1)
(FOR 9.1 OF IPSS:1-04-009-99)

Test circuit
(see Sub-clause 8.3.4.2 of Chapter I)

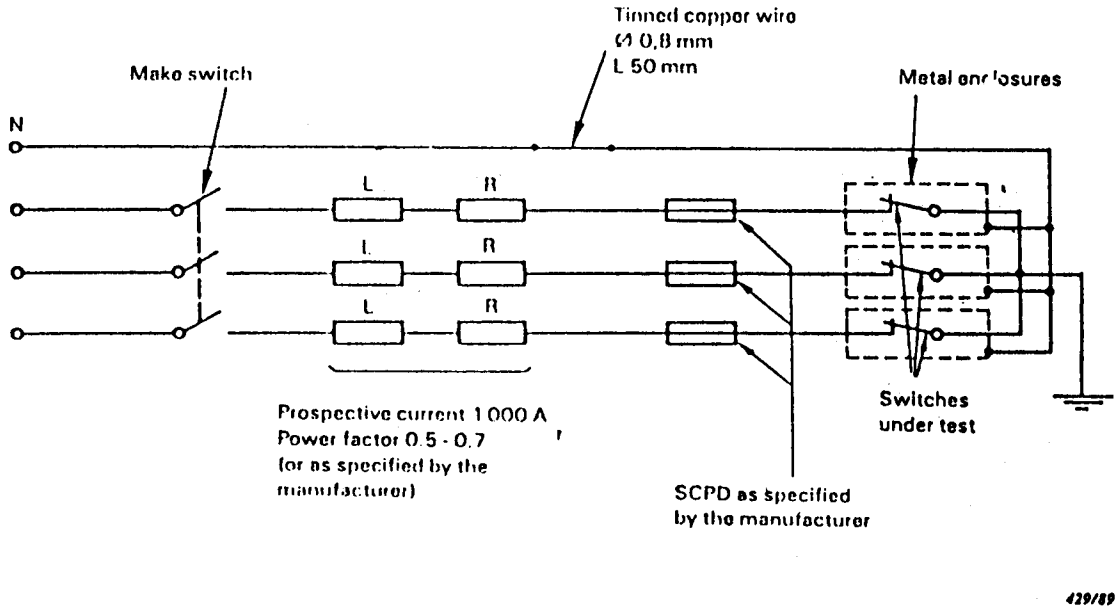

FIGURE 8

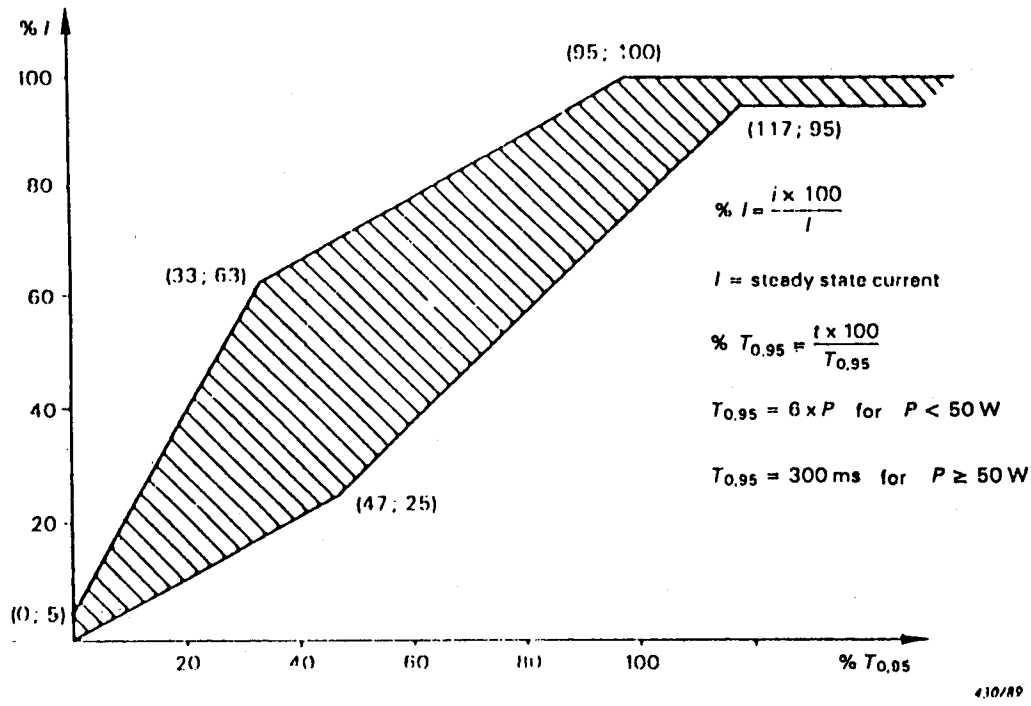

FIG. 9. – Current/time limits for d.c. test loads (see Sub-clause 8.3.3.5.3).