RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part H Electrical Installations

Rules for the Survey and Construction of Steel Ships
Part H 2010 AMENDMENT NO.1
Guidance for the Survey and Construction of Steel Ships
Part H 2010 AMENDMENT NO.1

Rule No.24 / Notice No.42 15th April 2010
Resolved by Technical Committee on 5th February 2010
Approved by Board of Directors on 23rd February 2010

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NIPPON KAIJI KYOKAI

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part H Electrical Installations

2010 AMENDMENT NO.1

Rule No.24 15th April 2010

Resolved by Technical Committee on 5th February 2010

Approved by Board of Directors on 23rd February 2010

Rule No.24 15th April 2010
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Rules for the survey and construction of steel ships" has been partly amended as follows:

Part H ELECTRICAL INSTALLATIONS

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.4 Rotating Machines

Table H2.2 has been amended as follows.

Table H2.2 Limits of Temperature Rise for Rotating Machines (Based on ambient temperatures of 45$^{\circ}C$)

Item	Part of rotating machine	Thermal ~~C~~class A ~~insulation~~			Thermal ~~C~~class E ~~insulation~~			Thermal ~~C~~class B ~~insulation~~			Thermal ~~C~~class F ~~insulation~~			Thermal ~~C~~class H ~~insulation~~		
		T	R	E.T.D	T	R	E.T.D	T	R	E.T.D	T	R	E.T.D	T	R	E.T.D
1a	*A.C.* windings of machines having outputs of 5,000*kW* (or *kVA*) or more	-	55	60	-	-	-	-	75	80	-	95	100	-	120	125
1b	*A.C.* windings of machines having outputs above 200*kW* (or *kVA*) but less than 5,000*kW* (or *kVA*)	-	55	60	-	70	-	-	75	85	-	100	105	-	120	125
1c	*A.C.* windings of machines having outputs of 200*kW* (or *kVA*) or less, other than those in items 1d or 1e *1	-	55	-	-	70	-	-	75	-	-	100	-	-	120	-
1d	*A.C.* windings of machines having rated outputs of less than 600*W* (or VA)*1	-	60	-	-	70	-	-	80	-	-	105	-	-	125	-
1e	*A.C.* windings of machines which are self-cooled without fan and/or with encapsulated windings*1	-	60	-	-	70	-	-	80	-	-	105	-	-	125	-
2	Windings of armatures having commutators	45	55	-	60	70	-	65	75	-	80	100	-	100	120	-
3	Field winding of *a.c.* and *d.c.* machines having *d.c.* excitation other than those in item 4	45	55	-	60	70	-	65	75	-	80	100	-	100	120	-
4a	Field windings of synchronous machines with cylindrical rotors having *d.c.* excitation winding embedded in slots except synchronous induction motors	-	-	-	-	-	-	-	85	-	-	105	-	-	130	-
4b	Stationary field windings, of *d.c.* machines, having more than one layer	45	55	-	60	70	-	65	75	85	80	100	105	100	120	130

4c	Low resistance field winding of *a.c.* and *d.c.* machines and compensating windings of *d.c.* machines having more than one layer	55	55	-	70	70	-	75	75	-	95	95	-	120	120	-
4d	Single-layer windings of *a.c.* and *d.c.* machines with exposed bare or varnished metal surfaces and single-layer compensating windings of *d.c.* machines*2	60	60	-	75	75	-	85	85	-	105	105	-	130	130	-
5	Permanently short-circuited windings	The temperature rise is in no case to reach such values that there are risks of damage to any insulating materials on adjacent parts.														
6	Commutators and slip-rings and their brushes and brush gear	The temperature rise is in no case to reach such values that there are risks of damage to any insulating materials on adjacent parts. In addition, temperatures are not to exceed that at which the combination of brush grade and commutator/slip-ring materials can handle the current over their complete operating range														
7	Magnetic cores and all structural components, whether or not in direct contact with insulation (excluding bearings)	The temperature rise is in no case to reach such values that there are risks of damage to any insulating materials on adjacent parts.														

Note:

1. In cases where the Super Position Method is applied to windings of machines rated 200*kW* (or *kVA*) or less with ~~Insulation~~ Thermal Classes A, E, B and F, marked with *1, the limits for temperature rise given for the Resistance Method may be exceeded by 5~~°C~~K
2. Also includes multiple layer windings marked with *2 provided that their under layers are each in contact with the circulating primary coolant.
3. T = Thermometer Method, R = Resistance Method, E.T.D. = Embedded Temperature Detector

2.5 Switchboards, Section Boards and Distribution Boards

Paragraph 2.5.4 has been amended as follows.

2.5.4 Busbars

1 Busbars are to be of copper having a conductivity of 97% or more.

2 Busbar connections are to be so made as to inhibit any corrosion and oxidization.

3 Busbars and busbar connections are to be supported so as to withstand any electromagnetic forces resulting from short-circuiting.

4 Temperature rises of busbars, connecting conductors and their connections are not to exceed 45~~°C~~K at ambient temperatures of 45°*C* in cases where they are carrying full-load currents. However, in cases where deemed appropriate by the Society, these requirements do not apply.

5 Clearance distances between live parts of different polarity or between live parts and earthed metals are not to be less than those values given in **Table H2.7**.

Table H2.7 Minimum Clearance Distances for Busbars

Rated voltage between poles or phases (*V*)	Minimum clearance (*mm*)	
	Between phases or poles of live Parts	Between live parts and earthed metals
125 or less	13	13
over 125 to 250 inclusive	16	13
over 250 to 500 inclusive	23	23

Table H2.10 has been amended as follows.

Table H2.10 Limits of Temperature Rise of Electrical Appliances for Switch Boards (Based on ambient temperatures of 45°C)

Item and part			Limits of temperature rise (~~°C~~K)	
			~~Thermometer method~~	~~Resistance method~~
Coils	Thermal ~~C~~class *A* insulation		45	~~65~~
	Thermal ~~C~~class *E* insulation		60	~~80~~
	Thermal ~~C~~class *B* insulation		75	~~95~~
	Single layer bare windings Thermal class *F*		~~75~~95	~~-~~
	Thermal class *H*		120	
Contact pieces	Mass forms	Copper or copper alloys	40	~~-~~
		Silver or silver alloys	70	~~-~~
	Multilayer forms or Knife forms	Copper or copper alloys	25	~~-~~
	~~Knife forms~~	~~Copper or copper alloys~~	~~25~~	~~-~~
Terminals for external cables			45	~~-~~
Metallic resistors	Moulded-case types		245	~~-~~
	Those other than moulded-case types	For continuous service	295	~~-~~
		For intermittent service	345	~~-~~
	Exhaust (approx. 25*mm* above exhaust ports)		170	~~-~~

2.6 Circuit-breakers, Fuses and Electromagnetic Contactors

Paragraphs 2.6.1, 2.6.2, and 2.6.3 have been amended as follows.

2.6.1 Circuit-breakers

1 Circuit-breakers are to comply with *IEC Publication* 60947-1 and 60947-2, or any equivalent thereto, amended in cases where necessary for ambient temperature; furthermore, they are also to comply with the requirements given in **-2** and **-3** below.

2 The construction of circuit-breakers is to comply with the following **(1)** to **(6)**:

(1) All circuit-breakers are to be trip-free types and depending upon the field of their application, trip attachments are to have time-delays or instantaneous overcurrent trip features or both.

(2) Main contacts of circuit-breakers are to be such as to have no undue burning or pitting. Arcing contacts, except those of moulded case circuit-breakers, are to be easily replaceable.

(3) Instantaneous trip devices other than those electronic types having suitable testing arrangements are to be of constructions capable of tripping associated breakers directly by short-circuit currents.

(4) Circuit-breakers are to be such that no accidental opening and closing occur due to ship vibrations, and, furthermore, no malfunctions caused by lists of angles of 30° in any direction.

(5) Fused circuit-breakers of moulded-case types are to be constructed so that single phasing does not occur in the event of blowing of fuses and that the fuses can be easily replaced without any risk of operating personnel accidentally touching any live-parts.

(6) Rated (operational) voltages, rated (thermal) currents, etc. as well as rated breaking capacities, rated making currents and rated short-time currents are to be clearly indicated on each

circuit-breaker according to their type. In addition, each time-delay overcurrent trip device is to have its operating characteristics indicated except for moulded-case circuit-breakers.

3 Circuit-breaker performance is to comply with the following **(1)** to **(4)**:

(1) Temperature rises in connecting terminals of cables are not to exceed 45~~°C~~K at ambient temperatures of 45°*C* in cases where 100% of rated currents are carried therethrough.

(2) All circuit-breakers, according to their kind, are to be such as to be able to securely break any over-currents not more than rated-braking capacities and safely make such circuit able to carry currents not more than those rated making currents under the circuit conditions specified in the standards referred to in **-1**.

(3) Time-delay over-current trip devices of circuit-breakers for generator circuits are to be such that any readjustment of current settings does not cause any remarkable changes in such time-delay features.

(4) The characteristics of time-delay overcurrent trip devices are not to be excessively affected by ambient temperatures.

2.6.2 Fuses

1 Fuses are to comply with *IEC Publication* 60269, or any equivalent thereto, amended in cases where necessary for ambient temperature; furthermore, they are also to comply with the requirements given in **-2** and **-3** below.

2 The construction of fuses is to comply with the following **(1)** to **(3)**:

(1) Fuses are to be enclosed types and their construction is to be such that such enclosures are neither broken nor burnt and any adjacent insulation cannot be damaged by any flowing of fused metal or emitting of gases in cases where fuse elements blow out.

(2) Fuses are to be easily replaceable with spares without any risk of electric shock or burning to any personnel replacing such fuses.

(3) Rated voltages, rated currents, etc. are to be clearly indicated on each fuse. In addition, rated breaking capacities, fusing characteristics and current-limiting characteristics according to its kind are also to be indicated. All such indications are to be clearly made using either values or symbols.

3 The performance of fuses and fuse-holders are to comply with the following **(1)** and **(2)**:

(1) Temperature rises in connecting terminals of cables are not to exceed 45~~°C~~K at ambient temperatures of 45°*C* in cases where fuses are fitted to fuse-holders; furthermore, 100% of rated currents are carried therethrough.

(2) Fuses are to have those fusing characteristics corresponding to their kind; furthermore, under those circuit conditions specified in the standards given in **-1** above, such fuses are to be capable of securely breaking all currents whichever is below their rated breaking capacity and above their fusing current.

2.6.3 Electromagnetic Contactors

1 Electromagnetic contactors are to comply with *IEC publications* 60947-1 and 60947-4-1, or any equivalent thereto, amended in cases where necessary for ambient temperature; furthermore, they are also to comply with the requirements given in **-2** and **-3**.

2 The construction of electromagnetic contactors is to comply with the following **(1)** to **(3)**:

(1) Electromagnetic contactors are to be such that no accidental opening and closing occurs due to ship vibration; furthermore, no malfunction is to be caused by any list of an angle of 30° in any direction.

(2) Contact pieces and magnetic coils are to be easily replaceable.

(3) Rated operational voltages, rated capacities or full-load currents corresponding to rated capacities, etc. as well as rated operational voltages and frequencies for control circuits, interruption current capacities and closed circuit current capacities are to be indicated on each electromagnetic contactor. Such indications are to be clearly made in either values or symbols.

3 The performance of electromagnetic contactors is to comply with the following **(1)** to **(3)**:

(1) Temperature rises in connecting terminals of cables are not to exceed 45~~°C~~K at ambient temperatures of 45°*C* in cases where full-load currents corresponding to rated capacities are carried therethrough.

(2) Electromagnetic contactors are to have suitable interruption current capacities and closed-circuit current capacities depending on their application.

(3) Electromagnetic contactors are not to accidentally open circuits at voltages exceeding 85% of rated voltages.

2.7 Control Appliances

Table H2.11 has been amended as follows.

Table H2.11 Minimum Clearances and Creepage Distances for Control Appliances

Rated insulating voltage (*V*) (*d.c* & *a.c.*)	Clearance (*mm*)						Creepage[3][4] (*mm*)					
	Less than 15 *A*[5]		15 *A* or over and 63 *A* or under[5]		Exceeding 63 *A*[5]		Less than 15 *A*[5]		15 *A* or over and 63 *A* or under[5]		Exceeding 63 *A*[5]	
	L-L[1]	*L-A*[2]	*L-L*[1]	*L-A*[2]	*L-L*[1]	*L-A*[2]	*a*	*b*	*a*	*b*	*a*	*b*
Not exceeding 60	2	3	2	3	3	5	2	3	2	3	3	4
Exceeding 60 and 250 or under	3	5	3	5	5	6	3	4	3	4	5	8
Exceeding 250 and 380 or under	4	6	4	6	6	8	4	6	4	6	6	10
Exceeding 380 and 500 or under	6	8	6	8	8	10	6	10	6	10	8	12

Notes:

1. "*L-L*" applies to those clearances between bare live parts and between live parts and earthed metal parts.
2. "*L-A*" applies to those clearances between live parts and insulated metal parts which become a live part due to insulation deterioration.
3. Creepage distances are to be determined by insulation thermal class ~~type~~ and shape.
   "*a*" applies to ceramic insulators (steatite and porcelain) and other comparable insulators, provided with ribbed construction or vertical partitions especially deigned to prevent any electricity leaks, which are recognized by experimentation to be equally as effective as ceramic insulators and which have tracking indices greater than 140*V*, *e.g.* phenol resins formed items.
   "*b*" applies to all other insulation materials.
4. In cases where "*L-A*" is greater than the corresponding creepages "*a*" or "*b*", creepage distances between live parts and insulated metals which operators may easily come in contact with and which become live parts by due to insulation deterioration are to be "*L-A*" or more.
5. Current values are to be expressed by rated current-carrying values.

2.8 Controlgears for Motors and Magnetic Brakes

Table H2.12 has been amended as follows.

Table H2.12 Limits of Temperature Rise of Controlgears for Motors (Based on ambient temperatures of 45°C)

Item and part				Limits of temperature rise (~~°C~~K)	
				~~Thermometer method~~	~~Resistance method~~
Coils (air)	Thermal ~~C~~class *A* ~~insulation~~			60	~~80~~
	Thermal ~~C~~class *E* ~~insulation~~			75	~~95~~
	Thermal ~~C~~class *B* ~~insulation~~			85	~~105~~
	Thermal ~~C~~class *F* ~~insulation~~			110	~~130~~
	Thermal ~~C~~class *H* ~~insulation~~			135	~~155~~
	Thermal ~~C~~class ~~*C*~~*N* ~~insulation~~			~~no limit~~155	~~no limit~~
	~~Single layer enamel windings~~		~~Class *A* insulation~~	~~80~~	-
			~~Class *E* insulation~~	~~95~~	-
			~~Class *B* insulation~~	~~105~~	-
			~~Class *F* insulation~~	~~130~~	-
			~~Class *H* insulation~~	~~155~~	-
			~~Class *C* insulation~~	~~no limit~~	-
Contact piece	Mass form	Continuous use over 8 *hours*	Copper or copper alloy	40	-
			Silver or silver alloy	70	-
		Switch on & off one attempt or more in about 8 *hours*	Copper or copper alloy	60	-
			Silver or silver alloy	70	-
	Multilayer form or knife form		Copper or copper alloy	35	-
Busbar and connecting conductor (bare or Thermal ~~C~~class *A* ~~insulation~~ and higher)				60	-
Terminals for external cables				45	-
Metallic resistors	Moulded-case type			245	-
	Those other than moulded-case type		For continuous use	295	-
			For intermittent use	345	-
			For starter use	345	-
	Exhaust (approx. 25*mm* above exhaust port)			170	-

Notes:

~~1. Measurements of the temperatures of voltage coils are in principle to be made only by the resistance method.~~

~~2. In cases where the insulation of single layer enamel windings is higher in class then that of any adjacent parts, any temperature rise associated with the insulation class of such adjacent parts is to be applied.~~

~~3. In the case of single layer bare windings, any temperature rise associated with the class of insulating material of adjacent parts is to be applied.~~

~~4.~~ The term "moulded-case type metal resistor" refers to those resistors which are to be buried in the insulation so that no surfaces of any metallic resistors are exposed.

2.10 Transformers for Power and Lighting

Paragraph 2.10.3 has been amended as follows.

2.10.3 Temperature Rise

Temperature rises of transformers are not to exceed those values given in **Table H2.15** during any continuous operation at rated outputs. ~~However, in cases where ambient temperatures are not more than 40°*C*, it may be increased by the difference from the values given in the table.~~

Table H2.15 Limits of Temperature Rise of Transformers
(Based on ambient temperatures of 45°*C*)

Part		Limits of temperature rise (~~°C~~K)					
		Measuring method	Thermal ~~C~~class *A* ~~insulation~~	Thermal ~~C~~class *E* ~~insulation~~	Thermal ~~C~~class *B* ~~insulation~~	Thermal ~~C~~class *F* ~~insulation~~	Thermal ~~C~~class *H* ~~insulation~~
Windings	Dry type transformer	Resistance method	55	70	75	95	120
	Oil-immersed transformer	Resistance method	60	-	-	-	-
Oil		Thermometer method	45				
Core		Thermometer method	Not exert injurious effects on adjacent insulations				

Paragraph 2.10.4 and 2.10.5 have been renumbered to paragraph 2.10.5 and 2.10.6 respectively, new paragraph 2.10.4 has been added.

2.10.4 Modification of the Limits of Temperature Rise

1 In cases where ambient temperatures exceed 45°C, limits of temperature rise are to be decreased by the difference from those values given in **Table H2.15**.

2 In cases where temperatures of primary coolants do not exceed 45°C, the limits of temperature rise may be increased in those cases deemed appropriate by the Society.

3 In cases where ambient temperatures do not exceed 45°C, limits of temperature rise may be increased by the difference from those values given by **Table H2.15**. In such cases, ambient temperatures are not to be set below 40°C.

2.10.4~~5~~ Voltage Regulation

Voltage regulation of transformers is not to exceed the following values at full loads and 100% power factors:

Single phase 5*kVA* or more and three-phase 15*kVA* or more: 2.5%

Single phase less than 5*kVA* and three-phase less than 15*kVA*: 5%

2.10.5~~6~~ Shop Tests

1 Transformers are to be tested in accordance with the requirements in this **2.10.5**. However, those tests required by **-2** may be omitted for those transformers which are produced in a series of identical types from the second unit onward subject to Society approval.

2 Temperature rises of transformers under rated full loads are not to exceed those values given in **2.10.3**.

3 Transformers are to undergo voltage regulation tests and are to comply with the requirements given in **2.10.4**. However, it may be permissible to obtain such information from calculations.
4 Immediately after such temperature tests have been performed, transformers are to be able to withstand high voltages by applying *a.c.* 1,000*V* plus twice the maximum line voltages of commercial frequencies, between windings and between windings and earths for a period of 1 *minute*. Test voltages in these tests are to be at least 1,500*V*.
5 Transformers are to be able to withstand for the duration of the test given by the following formula those cases where twice the normal voltage is induced on the winding at any frequency between 100 and 500*Hz*. However, the duration of such tests is to be for a period of at least 15 *seconds*, but not more than 60 *seconds*:

$$\text{Testing time } (\textit{second}) = 60 \times \frac{2 \times \text{Rated frequency}}{\text{Test frequency}}$$

2.14 Wiring Accessories

Paragraph 2.14.2 has been amended as follows.

2.14.2 Temperature Rises

Temperature rises of live parts are not to exceed 30~~°C~~K.

2.18 Tests after Installation on Board

Paragraph 2.18.1 has been amended as follows.

2.18.1 Insulation Resistance Test

1 In the case of circuits of electric propulsion, auxiliary power and lighting, insulation resistance between conductors and earths as well as~~, if applicable,~~ between conductors is to be measured and its value is to be less than those values specified in **Table H 2.17**.
2 Insulation resistance of internal communication circuits is to comply with the following **(1)** and **(2)**. In such cases, any or all appliances connected thereto may be disconnected.
(1) In the case of circuits of 100*V* and above, insulation resistance between conductors and earths as well as~~, if applicable,~~ between conductors is to be measured, using methods deemed appropriate by the Society, and its value is to be less than $1\,M\Omega$.
(2) In the case of circuits below 100*V*, insulation resistance is to be at least $1/3M\Omega$.
3 The insulation resistance of generators and motors under working temperatures is to be those values specified in **Table H2.6**.
~~**4** The insulation resistance of switchboards under working temperatures is to be in accordance with requirements given in **2.5.10-5.**~~

Table H2.17 Minimum Insulation Resistance

~~Load~~	~~Insulation resistance~~
~~Up to 5 A~~	~~2 MΩ~~
~~Up to 10 A~~	~~1 MΩ~~
~~Up to 25 A~~	~~400,000 Ω~~
~~Up to 50 A~~	~~250,000 Ω~~
~~Up to 100 A~~	~~100,000 Ω~~
~~Up to 200 A~~	~~50,000 Ω~~
~~Over 200 A~~	~~25,000 Ω~~

Rated voltage *Un* (*V*)	Minimum test voltage (*V*)	Minimum insulation resistance (*MΩ*)
Un ≤ 250	2 × *Un*	1
250 < *Un* ≤ 1,000	500	1
1,000 < *Un* ≤ 7,200	1,000	*Un*/1,000 + 1
7,200 < *Un*	5,000	*Un*/1,000 + 1

Note:

During the above tests, any or all electric heaters, small appliances and the like which are connected may be disconnected from any circuits.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 15 April 2010.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part H Electrical Installations

2010 AMENDMENT NO.1

Notice No.42 15th April 2010

Resolved by Technical Committee on 5th February 2010

Notice No.42 15th April 2010
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Guidance for the survey and construction of steel ships" has been partly amended as follows:

Part H ELECTRICAL INSTALLATIONS

H2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

H2.4 Rotating Machines

H2.4.3 Limits of Temperature Rise

Sub-paragraph -1 has been amended.

1 Temperature rise of bearings

(1) Temperature rise of bearings are not exceed 35~~℃~~K in cases where temperatures are measured on surfaces, 40~~℃~~K in cases where temperatures are measured by temperature elements embedded in metal, or 50~~℃~~K in cases where temperatures are measured on surfaces using heat resisting lubricants; for example, lithium soap based greases.

(2) In cases where heat resisting insulation of Class F or higher is used in rotating machines and it is difficult to apply those requirements specified in **(1)** above, documents relating to the heat resistance of bearings and lubricants are to be submitted to the Society for approval.

Paragraph 2.4.4 has been amended as follows.

H2.4.4 Modification of Limits of Temperature Rise

In dealing with the wording "in those cases where deemed appropriate by the Society" referred to in **2.4.4-2**, **Part H of the Rules**, limits of temperature rise may be modified as follows:

(1) In cases where forced cooling is provided and temperatures of cooling water at inlets of air coolers are not higher than 32°*C*, limits of temperature rise may be set 13~~℃~~K higher than those limits specified in **Table H2.2**, **Part H of the Rules**.

(2) In cases where forced cooling is provided and temperatures of cooling water at inlets of air coolers are higher than 32°*C*, limits of temperature rise may be determined by the Society in each case.

H2.5 Switchboards, Section Boards and Distribution Boards

Paragraph 2.5.4 has been amended as follows.

H2.5.4 Busbars

1 Busbars, contact faces of busbars and linking conductors are to be protected against any corrosion or oxidization by means of silver plating, tin plating or dippling in solder baths, etc.

2 Current ratings of busbars may generally be determined by **Table H2.5.4-1**.

3 The wording "in cases where deemed appropriate by the Society" in **2.5.4-4**, **Part H of the Rules** refers to cases where documents which show that there are no adverse effects on any of the following (1) to (5) are submitted to and approved by the Society in cases where the temperature rises of any busbars, connecting conductors and their connections that are carrying full-load currents exceed 45K at an ambient temperature of 45°C.

(1) Mechanical strength of the conducting material
(2) Possible effect on adjacent equipment
(3) Permissible temperature limits of the insulating materials in contact with the conductor
(4) Effect of the temperature of the conductor on the apparatus connected to busbars
(5) For plug-in contacts, the nature and surface treatment of the contact material

Section H2.10 has been added.

H2.10 Transformers for Power and Lighting

H2.10.4 Modification of the Limits of Temperature Rise

The wording "in those cases where deemed appropriate by the Society" in **2.10.4-2**, **Part H of the Rules** means that limits of temperature rise may be modified as follows:

(1) In cases where forced cooling is provided and the temperatures of cooling water at the inlets of air coolers are not higher than 32°C, limits of temperature rise may be set 13K higher than those limits specified in **Table H2.15**, **Part H of the Rules**.
(2) In cases where forced cooling is provided and the temperatures of cooling water at the inlets of coolers are higher than 32°C, limits of temperature rise may be determined by the Society on a case by case basis.

H2.4.15 Shop Tests

Sub-paragraph 1 has been amended.

1 The wording "generator or motor which is produced in series having identical type with their unit" referred to in **2.4.15-1, Part H of the Rules** means those generators or motors which are of the same capacity, voltage, current, rotational speed, principal dimensions, cooling method, ~~type of~~ insulation thermal class and manufactured according to the same process at the same plant. The wording "small capacity" means up to 100*kW* of continuous rating capacity.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 15 April 2010.