Amendment on 27 June 2024 Resolved by Technical Committee on 30 January 2024

Tests for Rotating Machines

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part H Rules for the Survey and Construction of Inland Waterway Ships Guidance for the Survey and Construction of Steel Ships Parts GF, H, and N Guidance for the Survey and Construction of Inland Waterway Ships

Reason for Amendment

IACS Unified Requirement (UR) E13(Rev.3) specifies test requirements for rotating machines, and these requirements have already been incorporated into the NK Rules.

In May 2022, IACS adopted UR E13(Rev.3)(Corr.1) to specify that reference values (upper limits of temperature rise) used for temperature rise tests of rotating machines are in accordance with relevant tables in IEC 60034-1:2017. Although the reference values for temperature rise tests specified in IEC 60034-1:2017 differ according to the cooling methods applied to rotating machines, the ones specified in the NK Rules do not. Therefore, it is necessary to classify the reference values for temperature rise tests specified in order to be consistent UR E13(Rev.3)(Corr.1). Accordingly, relevant requirements are amended in accordance with UR E13(Rev.3)(Corr.1).

In addition, tables related to shop tests and other tests required for rotating machines are amended to ensure they are consistent with requirements related to the omission of second and subsequent tests.

Outline of Amendment

- (1) Classify the reference values for the temperature rise tests of rotating machines by cooling method
- (2) Amend tables related to shop tests and other tests for rotating machines to ensure they are consistent with corresponding requirements related to the omission of second and subsequent tests.

Effective Date and Application

Effective date of this amendment is 27 June 2024.

ID: DD23-15

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Amended	Oliginal Requirement			Original				Remarks	
RULES FOR THE SU CONSTRUCTION OF S	RU CON								
Part H ELECTRICAL IN	FALLATIONS	Part H	ELECTI	RICAL II	ISTAI	LLATIO	NS		
Chapter 2 ELECTRICAL AND SYSTEM D	INSTALLATIONS SIGN	Chapter 2		CTRICA YSTEM			ΓIONS		
2.4 Rotating Machines		2.4 Rotat	ing Machiı	nes					
2.4.4 Modification of Limits of Table H2.3 Limits of Tempe	-		odification l on <u>an</u> Aml			-		(Amended) described UR E13 rev.2 corr.	only
	Thermal class A Therm	al class E Thermal	l class B The	ermal class F	Therm	nal class H			
Item Part of rotating machine	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 have outputs of 5,000 kW (or kVA) of more	- 55 60 -	7:	5 80 -	95 100	-	120 125			
(Omitted)					I				
7 Magnetic cores and all structur components, whether or not in contact with insulation (exclud bearings)	rect insulating materials on adj		values that the	re are risks of	damage	to any			
Notes:									
 In cases where the Super Position with *1, the limits for temperatu Also includes multiple layer with 	rise given for the Resistance M	lethod may be exceed	ed by 5 <i>K</i> are each in cont	tact with the o	irculating	g primary coo	olant.		
3. Limits for temperature rise of " relevant tables in <i>IEC</i> 60034-1:2		rogen" and "directly of	cooled winding	s and their co	olants" ai	re specified in	n reference to		

Amended-Original Requirements Comparison Table (Tests for Rotating Machines)

Amended	Original	Remarks
2.4.14 A.C. Generators 3 In cases where generators are driven at rated speeds, giving rated voltages and they are subjected to sudden changes of symmetrical loads within the limits of specified currents and power factors (see 2.4.15(4)), voltages are not to fall below 85 % nor exceed 120 % of the rated voltages. Voltages of such generators are then to be restored to within \pm 3 % of their rated voltage in a period of not more than 1.5 seconds. However, in the case of emergency generators, such voltage values may be increased to \pm 4 % in a period of not more than 5 seconds.	2.4.14 A.C. Generators 3 In cases where generators are driven at rated speeds, giving rated voltages and they are subjected to sudden changes of symmetrical loads within the limits of specified currents and power factors (see 2.4.15(2)), voltages are not to fall below 85 % nor exceed 120 % of the rated voltages. Voltages of such generators are then to be restored to within \pm 3 % of their rated voltage in a period of not more than 1.5 <i>seconds</i> . However, in the case of emergency generators, such voltage values may be increased to \pm 4 % in a period of not more than 5 <i>seconds</i> .	To change of entry of 2.4.15, Rules of Part H
 2.4.15 Shop Tests* Rotating machines are to be tested in the following (1) to (13) in accordance with Table H2.6. In addition, all tests are to be carried out in accordance with <i>IEC</i> 60092-301:1980/AMD2:1995. However, those tests required by (5) and (7) below may be omitted subject to the Society's permission for each generator or motor which is produced in series having identical type with their unit. Furthermore, those tests required by (6) below may be omitted for each generator or motor which is produced in a series of identical types with their unit. (1) Visual examinations of rotating machines are to be carried out. Such visual examinations are to ensure, as far as is practicable, that rotating machines comply with their technical documentation (e.g. design drawings, specifications). (2) Immediately after those high voltage tests specified in (9) have been performed, the insulation resistance of such rotating machines is to be measured in 	 2.4.15 Shop Tests* Rotating machines are to be tested in the following (1) to (12) in accordance with Table H2.6. In addition, all tests are to be carried out in accordance with <i>IEC</i> 60092-301:1980/AMD2:1995. However, those tests required by (5) and (7) below may be omitted subject to the Society's permission for each generator or motor which is produced in series having identical type with their unit. Furthermore, those tests required by (4) below may be omitted for each generator or motor which is of small capacity and which is produced in a series of identical types with their unit. (1) Visual examinations of rotating machines are to be carried out. Such visual examinations are to ensure, as far as is practicable, that rotating machines comply with their technical documentation (e.g. design drawings, specifications). (2) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence 	(1) No change Current (9) to (2)

 accordance with Table H2.8 and all values are not to be less than any of those specified in Table H2.8. In addition, during such measuring, temperatures of rotating machines are to be near operating temperature. However, in cases where this is difficult, appropriate methods of calculation may be used instead. (3) Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current with a power factor of between 0.4 lagging and zero is to be carried out and comply with the requirements given in 2.4.14-2, and -3. In the absence of precise information concerning the maximum values of any sudden loads when applying the requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the requirements given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the requirements given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the measurements given in 2.4.14-3 and when applying the requirement given in 2.4.14-4 and when applying the requirement given in 2.4.14-5 and when applying the requirement given in 2.4.14-5 and when applying the requirement given in 2.4.14-4 and when applying the requirement given in 2.4.14-5 and when applying the requirement given in 2.4.14-5 and when applying the requirement given in 2.4.14-5 and when applying the requireme	Amended	Original Remarks
 addition, during such measuring, temperatures of rotating machines are to be near operating temperature. However, in cases where this is difficult, appropriate methods of calculation may be used instead. (3) Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current method. (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.13-2, and -3. In the absence of precise information concerning the maximum values of any sudden loads when applying the requirement given in 2.4.13-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-3, 60 % of the rated current with a power factor of between 0.4 lagging machines are to be carried out in accordance with 2.4.5 and such machines are to have the capability to withstand such tests (see <i>IEC</i> 60034-1:2017). (4) Difference of any sudden loads when applying the requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging mad zero is to be suddenly switched on with the 	accordance with Table H2.8 and all values are not to	of precise information concerning the maximum
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 temperature. However, in cases where this is difficult, appropriate methods of calculation may be used instead. (3) Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current method. (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the 	addition, during such measuring, temperatures of	requirement given in 2.4.14-3, 60 % of the rated
 appropriate methods of calculation may be used instead. (3) Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current method. (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.13-4, or 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the generator running at no load, and then switched off after attaining steady-state conditions. However, the voltage regulation during transient conditions may be calculated values based upon the test records of identical type generators subject to the Society's permission. (3) Machine winding resistance is to be measured. The resistances of generators, voltage regulation tests are to be carried out in accordance with 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the 	rotating machines are to be near operating	
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 (3) Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current method. (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the 	appropriate methods of calculation may be used	generator running at no load, and then switched off
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 (3) Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current method. (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the (3) Rotating machines with commutators are to work with fixed brushes settings from no loads to 50 % overloads without any harmful sparking. (3) Overcurrent or excess torque tests for rotating machines are to be carried out in accordance with 2.4.5 and such machines are to have the capability to withstand such tests (see <i>IEC</i> 60034-1:2017). (4) Overcurrent with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the 		
 (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the (3) Kotaling Infactifies with Commutators are to work with Commutators are to work overloads with commutators are to work overloads with commutators are to work overloads without any harmful sparking. (4) Overcurrent or excess torque tests for rotating machines are to be carried out in accordance with 2.4.5 and such machines are to have the capability to withstand such tests (see IEC 60034-1:2017). (4) Overcurrent with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the 	(3) Machine winding resistance is to be measured. The	
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 bridge method, or a voltage and current method. (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applying the requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the 		with fixed brushes settings from no loads to 50 %
 (4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applying the requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the (4) Overcurrent or excess torque tests for rotating machines are to be carried out in accordance with 2.4.5 and such machines are to have the capability to withstand such tests (see <i>IEC</i> 60034-1:2017). 		overloads without any harmful sparking.
(4) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applying the requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the		(4) Overcurrent or excess torque tests for rotating Current (2) to (4)
to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applying the requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the	(4) In the case of generators, voltage regulation tests are	
given in 2.4.13-4, or 2.4.14-2 and -3. In the absence of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the	to be carried out and comply with the requirements	
of precise information concerning the maximum values of any sudden loads when applyingthe requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the	given in 2.4.13-4, or 2.4.14-2 and -3. In the absence	
requirement given in 2.4.14-3, 60 % of the rated current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the	of precise information concerning the maximum	
current with a power factor of between 0.4 lagging and zero is to be suddenly switched on with the	values of any sudden loads when applyingthe	
and zero is to be suddenly switched on with the	· · ·	
seven termine at no load and then arritched off		
	generator running at no load and then switched off	
after attaining steady-state conditions. However, the		
voltage regulation during transient conditions may be		
calculated values based upon the test records of		
identical type generators subject to the Society's permission (5). Steady short circuit tests for synchronous generators (Current (7) to (5))		\mathcal{O} to \mathcal{O} to \mathcal{O}
(5) <u>Steady short-circuit tests for synchronous generators</u>		(5) <u>Steady short-circuit tests for synchronous generators</u>
(5) <u>After rotating machines are run continuously under</u> are to be carried out and comply with the requirements		
actual load methods at their rated output voltages, frequencies and these duties for which they are being	· · · · ·	
<u>frequencies, and those duties for which they are being</u> <u>short-circuit may be of any time delay which will be</u>	irequencies, and those duties for which they are being	

Amended	Original	Remarks
rated until their temperatures have reached a steady	fitted in the tripping device for selective tripping	
state, the temperature rise of each part is to be	where precise data showing such time delay is	
measured and is not to exceed the value given in 2.4.3	available in accordance with the following (a) and (b).	
(see IEC 60034-1:2017). In cases where it is	The manufacturer's simulation model for the	
considered to be acceptable by the Society, such tests	generator and the voltage regulator may be used	
may be carried out in accordance with separately	where this has been validated through tests of	
specified procedures.	identical types of the same model.	
	(a) In order to provide sufficient information to the	
	party responsible for determining the	
	discrimination settings in the distribution system	
	where the generator is going to be used, the	
	generator manufacturer is to provide	
	documentation showing the transient behavior of	
	the short-circuit current upon a sudden short-	
	circuit occurring when excited and running at	
	nominal speed.	
	(b) The influence of the automatic voltage regulator	
	is to be taken into account, and the setting	
	parameters for the voltage regulator are to be	
	noted together with the decrement curve. Such a	
	decrement curve is to be available when the	
	setting of the distribution system's short-circuit	
	protection is calculated. The decrement curve	
(6) Overcurrent or excess torque tests for rotating	(6) <u>need not be based upon physical testing.</u>(6) Overspeed tests for rotating machines are to be carried	Current (4) to (6)
machines are to be carried out in accordance with	out and comply with the requirements given in 2.4.7	
2.4.5, and such machines are to have the capability to	(see <i>IEC</i> 60034-1:2017). Such tests, however, are not	
withstand such tests (see <i>IEC</i> 60034-1:2017).	applicable to squirrel cage motors.	
$\frac{\text{withstand such tests (see 120,00034-1.2017).}}{\text{withstand such tests (see 120,00034-1.2017).}}$		
(7) Steady short-circuit tests for synchronous generators	(7) After rotating machines are run continuously under	Current (5) to (7)
are to be carried out and comply with the requirements	actual load methods at their rated output voltages,	
given in 2.4.6-2. However, the duration of a steady	frequencies, and those duties for which they are being	
short-circuit may be of any time delay which will be	rated until their temperatures have reached a steady	
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Amended		Original	Remarks
fitted in the tripping device for selective tripping		state, the temperature rise of each part is to be	
where precise data showing such time delay is		measured and is not exceed the value given in 2.4.3	
available in accordance with the following (a) and (b).		(see <i>IEC</i> 60034-1:2017). In cases where it is	
The manufacturer's simulation model for the		considered to be acceptable by the Society, such tests	
generator and the voltage regulator may be used		may be carried out in accordance with separately	
where this has been validated through tests of		specified procedures.	
identical types of the same model.			
(a) In order to provide sufficient information to the			
party responsible for determining the			
discrimination settings in the distribution system			
where the generator is going to be used, the			
generator manufacturer is to provide			
documentation showing the transient behavior of			
the short-circuit current upon a sudden short-			
circuit occurring when excited and running at			
nominal speed.			
(b) The influence of the automatic voltage regulator			
is to be taken into account, and the setting			
parameters for the voltage regulator are to be			
noted together with the decrement curve. Such a			
decrement curve is to be available when the			
setting of the distribution system's short-circuit			
protection is calculated. The decrement curve			
<u>need not be based upon physical testing.</u>	(8)	The high voltage levels specified in Table H2.7 are to	Current (6) to (8)
(8) <u>Overspeed tests for rotating machines are to be carried</u>		be applied for a period of 1 minute between live parts	Current (0) to (0)
out and comply with the requirements given in 2.4.7 $(acc, WC, 60024, 1, 2017)$. Such tosts, however, are not		and frames of rotating machines, with those cores and	
(see <i>IEC</i> 60034-1:2017). Such tests, however, are not applicable to squirrel cage motors.		windings not undergoing testing connected to such	
applicable to squiffer cage motors.		frames (see IEC 60034-1:2017). In the cases of	
		machines with rated voltage above $1 kV$, tests are to	
		be carried out in accordance with the requirements	
		given in 2.17.6-4. Furthermore, where those	
		temperature rise tests specified in (7) above are	

	Amended		Original	Remarks
			applied, high voltage tests are to be carried out after the test.	
(9)	The high voltage levels specified in Table H2.7 are to be applied for a period of 1 <i>minute</i> between live parts	(9)	Immediately after those high voltage tests specified in (8) above have been performed, the insulation	Current (8) to (9)
	and frames of rotating machines, with those cores and		resistance of such rotating machines is to be	
	windings not undergoing testing connected to such frames (see <i>IEC</i> 60034-1:2017). In the cases of		measured in accordance with Table H2.8 and all	
	machines with rated voltages above $1 kV$, tests are to		values are not to be less than any of those specified in Table H2.8 . In addition, during such measuring,	
	be carried out in accordance with the requirements		temperatures of rotating machines are to be near	
	given in 2.17.6-4. Furthermore, where those		operating temperature. However, in cases where this	
	temperature rise tests specified in (5) above are applied, high voltage tests are to be carried out after		is difficult, appropriate methods of calculation may be used instead.	
	the test.		used instead.	
(10)	No-load tests of rotating machines are to be carried	(10)	Machine winding resistance is to be measured. The	\mathbf{C} (11) (10)
	out. Machines are to be operated at no load and rated		resistances of the machine windings are to be	Current (11) to (10)
	speed whilst being supplied at rated voltage and frequency when used as a motor, or are to be driven		measured and recorded using either an appropriate bridge method, or a voltage and current method.	
	by a suitable means and excited to give rated terminal		bruge method, or a voltage and current method.	
	voltage when used as a generator. During such tests,			
	machine vibrations and bearing lubrication system			
	operations are to be checked and confirmed to be in good order.	(11)	No-load tests of rotating machines are to be carried	New (11)
(11)		(11)	out. Machines are to be operated at no load and rated	URE13(Rev.3)Corr.1
	specified in IEC 60034-5:2000+AMD1:2006.		speed whilst being supplied at rated voltage and	4.11
			frequency when used as a motor, or are to be driven	
			by a suitable means and excited to give rated terminal voltage when used as a generator. During such tests,	
			machine vibrations and bearing lubrication system	
			operations are to be checked and confirmed to be in	
		(12)	good order.	
(12)	Upon completion of the above tests, machines which	(12)	Upon completion of the above tests, machines which have sleeve bearings are to be opened and examined	(12) No change
1	have sleeve bearings are to be opened and examined		and show country are to be opened and examined	

	Amended			Remarks		
13) Rotating	where deemed necessary by machines with commutated brushes settings from no	rs are to work	in case (Newly adde	Current (3) to (13)		
	without any harmful sparki					
overtoaus		<u>ng.</u>				
	Tal	ole H2.6 Tests for	r Rotating Machi	nes		(Amended) o
		Generators		Motors		described.
No.	Tests	First generator produced in a series of identical type	Other generators produced in a series of identical type	First motor produced in a series	Other motors produced in a series	clarification
		units ⁽¹⁾	units ⁽²⁾	of identical type units ⁽¹⁾	of identical type units ⁽²⁾	
1	Examination of the technical documentation, as appropriate and visual examination	X	X	X	X	
2	Insulation resistance measurement	X	X	X	x	
3	Winding resistance measurement	х	Х	Х	х	
4	Verification of the voltage regulation system ⁽⁷⁾	X	x ⁽³⁾			
5	Rated load test and temperature rise measurements	Х	<u>x⁽⁸⁾</u>	х	<u>x⁽⁸⁾</u>	
6	Overload/overcurrent test	Х	x ⁽⁴⁾	Х	x ⁽⁴⁾	
7	Verification of steady short circuit conditions ⁽⁵⁾	х	<u>x⁽⁸⁾</u>			
8	Overspeed test	Х	Х	x ⁽⁶⁾	X ⁽⁶⁾	
9	High voltage tests	Х	Х	Х	х	
10	No-load test	Х	Х	Х	X	
11	Verification of degree of protection	X		х		
12	Verification of bearings	Х	Х	Х	х	

(4) Only applicable to machines with rated outputs above of 100 kW used for essential services.

	Amended	Original	Remarks
(5)	Verification of steady short circuit condition applies to synchronou	s generators only.	
(6)	Not applicable to squirrel cage motors.		
(7)	Not applicable to D.C. generators.		
(8)	Tests may be omitted subject to Society approval for each rotating	machine which is produced in series of identical type units.	

	Amended								Origina	al			,	Remark	s
RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS				RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS											
Part 8	ELECTRICAL INST	ALLATI(ONS	S	Par	rt 8	ELE	CTF	RICAI	LIN	STAL	LAT	IONS		
Chapter 2	2 ELECTRICAL INS AND SYSTEM DESIG		ION	IS	Chaj	pter 2			TRIC STEM			LLA	ΓIONS		
2.4 Rota	ating Machines				2.4	Rota	ting Ma	chine	es						
2.4.4 N	Modification of Limits of Te	mperature	Rise [:]	*	2.4.4	4 M	odificat	tion o	of Limi	ts of	Гетре	ratur	e Rise*		
	Modification of Limits of Ten	-									-			(Amended)	only
Tab		e Rise for R	Rotati A T	ing Ma	achines class E	(Based) Therma	d on <u>an</u> A l class B	Ambi Therr	ent Ten	npera F TI	ture of	45 °C ass H		(Amended) described UR E13 rev.2 c	v
Tab	ble 8.2.2 Limits of Temperatur	e Rise for R	Rotati A T 2.T.D T	ing Ma	achines	(Based Therma T F	d on <u>an</u> A l class B	Ambi Therr	ent Ten nal class R E.	npera	ture of	45 °C ass H E.T.D		described	v
Tab Iter 1a	ble 8.2.2 Limits of Temperatur m Part of rotating machine A.C. windings of machines having outputs of 5,000 kW (or kVA) or more mitted)	e Rise for R Thermal class T R E - 55 6	Rotati A T 2.T.D T 50 -	ing Ma Thermal T R -	achines class E E.T.D	(Based Therma T R - 7	d on <u>an</u> A 1 class B 8 E.T.D 5 80	Ambi Therr T	ent Ten nal class R E. 95 10	npera F TI T.D T 00 -	ture of hermal cli R 120	45 °C ass H E.T.D 125		described	v
Tab Iter 1a	ble 8.2.2 Limits of Temperature m Part of rotating machine A.C. windings of machines having outputs of 5,000 kW (or kVA) or more	re Rise for R Thermal class. T R E - 55 6 The temperature	Rotati A T 2.T.D T i0 -	ing Ma <u>Fhermal</u> <u>F</u> is in no	achines class E E.T.D - case to re	(Based Therma T R - 7	d on <u>an</u> A 1 class B 8 E.T.D 5 80	Ambi Therr T	ent Ten nal class R E. 95 10	npera F TI T.D T 00 -	ture of hermal cli R 120	45 °C ass H E.T.D 125		described	U
Tab Iter 1a	ble 8.2.2 Limits of Temperature Part of rotating machine A.C. windings of machines having outputs of 5,000 kW (or kVA) or more mitted) Magnetic cores and all structural components, whether or not in direct contact with insulation (excluding bearings)	e Rise for R Thermal class T R E - 55 6 The temperatur insulating mate	Rotati A T 5.T.D T 50 - ure rise erials c	ing Ma <u>Fhermal</u> <u>Γ</u> R - is in no on adjac	achines class E E.T.D - case to re ent parts.	(Based Therma T R - 7	d on <u>an</u> A l class B E.T.D 5 80 values tha	Ambie Therr T -	ent Ten nal class R E. 95 10 are risks	$\begin{array}{c c} npera\\ F & Ti\\ T.D & T\\ \hline 00 & -\\ \hline \\ of dam \end{array}$	ture of hermal cla R 120 age to any	45 °C ass H E.T.D 125)	described UR E13 rev.2 c	U
Tab Iter 1a (Or 7	ble 8.2.2 Limits of Temperature Part of rotating machine A. C. windings of machines having outputs of 5,000 kW (or kVA) or more mitted) Magnetic cores and all structural components, whether or not in direct contact with insulation (excluding bearings) In cases where the Super Position Met	e Rise for R Thermal class . T R E - 55 6 The temperature insulating mate	A T A T C.T.D T 60 - ure rise erials c o wind: 0	ing Mi <u>Chermal</u> <u>C</u> is in no on adjac	achines class E E.T.D - case to re ent parts.	(Based Therma T F - 7 each such	d on <u>an</u> A l class B E.T.D 5 80 values tha	Ambio Therr T -	ent Ten nal class R E. 95 10 are risks	$\begin{array}{c c} npera\\ F & Ti\\ T.D & T\\ \hline 00 & -\\ \hline \\ of dam \end{array}$	ture of hermal cla R 120 age to any	45 °C ass H E.T.D 125)	described UR E13 rev.2 c	U
Tab Iter 1a (Or 7 Notes: 1.	ble 8.2.2 Limits of Temperature m Part of rotating machine A. C. windings of machines having outputs of 5,000 kW (or kVA) or more mitted) Magnetic cores and all structural components, whether or not in direct contact with insulation (excluding bearings) In cases where the Super Position Met with *1, the limits for temperature rise	e Rise for R Thermal class T R E - 55 66 The temperatur insulating mate	A T A T C.T.D T i0 - i0 - interrise interrise erials c o wind: Resistar	ing Ma Chermal C R - is in no on adjac lings of 1 nce Met	achines class E E.T.D - case to re ent parts. nachines r hod may b	(Based Therma T F - 7 each such	d on <u>an</u> <u>A</u> l class B E.T.D 5 80 values tha <i>kW</i> (or <i>kV</i> led by 5 <i>K</i>	Ambio Therr T -	ent Ten nal class R E. 95 10 are risks	hpera F TI T.D T 00 -	ture of nermal cli R 120 age to an	45 °C ass H E.T.D 125) Ind F, marked	described UR E13 rev.2 c	U
Tab Iter 1a (Or 7	ble 8.2.2 Limits of Temperature Part of rotating machine A. C. windings of machines having outputs of 5,000 kW (or kVA) or more mitted) Magnetic cores and all structural components, whether or not in direct contact with insulation (excluding bearings) In cases where the Super Position Met	e Rise for R Thermal class T R E - 55 6 The temperatur insulating mate hod is applied to given for the R marked with *2	A T A T 2.T.D T i0 - i0 - ure rise erials of o wind: Resistar 2 provi 2 provi	ing Ma <u>Chermal</u> <u>C</u> is in no on adjac lings of r nce Met ided that	achines class E E.T.D - case to re ent parts. machines to hod may b their under	(Based Therma T F - 7 each such	$\frac{d \text{ on } an }{2}$ $\frac{1 \text{ class B}}{2}$ $E.T.D$ $5 80$ $Values tha$ $W (or kW)$ $kW (or kW)$	Ambie Therr T - t there	ent Ten nal class R E. 95 10 are risks	hermal e circul	ture of hermal cli R 120 age to any Classes A ating prin	45 °C ass H E.T.D 125 y A, E, B a nary coo) und F, markec	described UR E13 rev.2 c	U

Amended	Original	Remarks
$\underline{4}$. T = Thermometer Method, R = Resistance Method, E.T.D. = Embe	dded Temperature Detector	
2.4.14 A.C. Generators 3 In cases where generators are driven at rated speeds, giving rated voltages and they are subjected to sudden changes of symmetrical loads within the limits of specified currents and power factors (see 2.4.15(<u>4</u>)), voltages are not to fall below 85_% nor exceed 120 % of the rated voltages. Voltages of such generators are then to be restored to within ± 3 % of their rated voltage in a period of not more than 1.5 seconds.	2.4.14 A.C. Generators 3 In cases where generators are driven at rated speeds, giving rated voltages and they are subjected to sudden changes of symmetrical loads within the limits of specified currents and power factors (see 2.4.15($\underline{2}$)), voltages are not to fall below 85_% nor exceed 120 % of the rated voltages. Voltages of such generators are then to be restored to within ± 3 % of their rated voltage in a period of not more than 1.5 seconds.	To change of entry of 2.4.15, Rules of Part H
 2.4.15 Shop Tests* Rotating machines are to be tested in the following (1) to (13) in accordance with Table 8.2.5. In addition, all tests are to be carried out in accordance with <i>IEC</i> 60092-301:1980/AMD2:1995. However, those tests required by (5) and (7) below may be omitted subject to the Society's permission for each generator or motor which is produced in series having identical type with their unit. Furthermore, those tests required by (6) below may be omitted for each generator or motor which is produced in a series of identical types with their unit. (1) Visual examinations of rotating machines are to be carried out. Such visual examinations are to ensure, as far as is practicable, that rotating machines comply with their technical documentation (e.g. design drawings, specifications). (2) Immediately after those high voltage tests specified in (9) have been performed, the insulation resistance of such rotating machines is to be measured in	 2.4.15 Shop Tests* Rotating machines are to be tested in the following (1) to (12) in accordance with Table 8.2.5. In addition, all tests are to be carried out in accordance with <i>IEC</i> 60092-301:1980/AMD2:1995. However, those tests required by (5) and (7) below may be omitted subject to the Society's permission for each generator or motor which is produced in series having identical type with their unit. Furthermore, those tests required by (4) below may be omitted for each generator or motor which is produced in a series of identical types with their unit. (1) Visual examinations of rotating machines are to be carried out. Such visual examinations are to ensure, as far as is practicable, that rotating machines comply with their technical documentation (e.g. design drawings, specifications). (2) In the case of generators, voltage regulation tests are to be carried out and comply with the requirements given in 2.4.13-4, or 2.4.14-2 and -3. In the absence	(1) No change Current (9) to (2)

	Amended		Original	Remarks
	accordance with Table 8.2.7 and all values are not to		of precise information concerning the maximum	
	be less than any of those specified in Table 8.2.7. In		values of any sudden loads when applying the	
	addition, during such measuring, temperatures of		requirement given in 2.4.14-3, 60% of the rated	
	rotating machines are to be near operating		current with a power factor of between 0.4 lagging	
	temperature. However, in cases where this is difficult,		and zero is to be suddenly switched on with the	
	appropriate methods of calculation may be used		generator running at no load, and then switched off	
	instead.		after attaining steady-state conditions. However, the	
			voltage regulation during transient conditions may be	
			calculated values based upon the test records of	
			identical type generators subject to the Society's	
(3)	Machine winding resistance is to be measured. The		permission.	\mathbf{C} (10) (2)
(3)	resistances of the machine windings are to be	(3)	Rotating machines with commutators are to work	Current (10) to (3)
	measured and recorded using either an appropriate		with fixed brushes settings from no loads to 50%	
	bridge method or a voltage and current method.		overloads without any harmful sparking.	
(4)	In the case of generators, voltage regulation tests are	(4)	Overcurrent or excess torque tests for rotating	
. ,	to be carried out and comply with the requirements	(+)	machines are to be carried out in accordance with	Current (2) to (4)
	given in 2.4.13-4, or 2.4.14-2 and -3. In the absence		2.4.5 and such machines are to have the capability to	
	of precise information concerning the maximum		withstand such tests (see <i>IEC</i> 60034-1:2017).	
	values of any sudden loads when applying the			
	requirement given in 2.4.14-3, 60 % of the rated			
	current with a power factor of between 0.4 lagging			
	and zero is to be suddenly switched on with the			
	generator running at no load and then switched off			
	after attaining steady-state conditions. However, the			
	voltage regulation during transient conditions may be			
	calculated values based upon the test records of			
	identical type generators subject to the Society's			
	permission.	(5)	Steady short-circuit tests for synchronous generators	Current (7) to (5)
(5)	After rotating machines are run continuously under	~ /	are to be carried out and comply with the	$\operatorname{Current}(7) \operatorname{to}(5)$
	actual load methods at their rated output voltages,		requirements given in 2.4.6-2. However, the duration	
	frequencies, and those duties for which they are being		of steady short-circuit may be of any time delay which	
	rated until their temperatures have reached a steady			

Amended		Original	Remarks
state, the temperature rise of each part is to be		will be fitted in the tripping device for selective	
measured and is not to exceed the value given in 2.4.3		tripping where precise data showing such time delay	
(see IEC 60034-1:2017). In cases where it is		is available in accordance with the following (a) and	
considered to be acceptable by the Society, such tests		(b). The manufacturer's simulation model for the	
may be carried out in accordance with separately		generator and the voltage regulator may be used	
specified procedures.		where this has been validated through tests of	
		identical types of the same model.	
		(a) In order to provide sufficient information to the	
		party responsible for determining the	
		discrimination settings in the distribution system	
		where the generator is going to be used, the	
		generator manufacturer is to provide	
		documentation showing the transient behaviour	
		of the short-circuit current upon a sudden short-	
		circuit occurring when excited, and running at	
		nominal speed.	
		(b) The influence of the automatic voltage regulator	
		is to be taken into account, and the setting	
		parameters for the voltage regulator are to be	
		noted together with the decrement curve. Such a	
		decrement curve is to be available when the	
		setting of the distribution system's short-circuit	
		protection is calculated. The decrement curve	
(6) Overcurrent or excess torque tests for rotating	(6)	<u>need not be based upon physical testing.</u> Overspeed tests for rotating machines are to be carried	Current (4) to (6)
machines are to be carried out in accordance with	(0)	out and comply with the requirements given in 2.4.7	
2.4.5, and such machines are to have the capability to		(see <i>IEC</i> 60034-1:2017). Such tests, however, are not	
withstand such tests (see <i>IEC</i> 60034-1:2017).		applicable to squirrel cage motors.	
$\frac{\text{withstand such usis (see TLC 00057-1.2017).}{\text{withstand such usis (see TLC 00057-1.2017)}{\text{withstand such usis (see TLC 00057-1.2017)}{\text{withstand such usis (see TLC 00057-1.2017)}{\text{withstand such usis (see TLC 00057-1.2017}{\text{withstand such usis (see TLC 00057-1.2017}{withsta$		appreable to squitter eage motors.	
(7) Steady short-circuit tests for synchronous generators			$C_{\text{result}}\left(5\right) 4_{\text{res}}\left(7\right)$
are to be carried out and comply with the	(7)	After rotating machines are run continuously under	Current (5) to (7)
requirements given in 2.4.6-2. However, the duration	. /	actual load methods at their rated output voltages,	
of steady short-circuit may be of any time delay which		frequencies, and those duties for which they are being	
		13/21	

Amended	Original	Remarks
will be fitted in the tripping device for selective	rated until their temperatures have reached a steady	
tripping where precise data showing such time delay	state, the temperature rise of each part is to be	
is available in accordance with the following (a) and	measured and is not exceed the value given in 2.4.3	
(b). The manufacturer's simulation model for the	(see IEC 60034-1:2017). In cases where it is	
generator and the voltage regulator may be used	considered to be acceptable by the Society, such tests	
where this has been validated through tests of	may be carried out in accordance with separately	
identical types of the same model.	specified procedures.	
(a) In order to provide sufficient information to the		
party responsible for determining the		
discrimination settings in the distribution system		
where the generator is going to be used, the		
generator manufacturer is to provide		
documentation showing the transient behaviour		
of the short-circuit current upon a sudden short-		
circuit occurring when excited, and running at		
nominal speed.		
(b) The influence of the automatic voltage regulator		
is to be taken into account, and the setting		
parameters for the voltage regulator are to be		
noted together with the decrement curve. Such a		
decrement curve is to be available when the		
setting of the distribution system's short-circuit		
protection is calculated. The decrement curve		
need not be based upon physical testing.		Current (6) to (9)
(8) <u>Overspeed tests for rotating machines are to be carried</u>	(8) The high voltage levels specified in Table 8.2.6 are to	Current (6) to (8)
out and comply with the requirements given in 2.4.7	be applied for a period of 1 <i>minute</i> between live parts	
(see <i>IEC</i> 60034-1:2017). Such tests, however, are not	and frames of rotating machines, with those cores	
applicable to squirrel cage motors.	and windings not undergoing testing connected to	
	such frames (see IEC 60034-1:2017). Furthermore,	
	where those temperature rise tests specified in (7)	
	above are applied, high voltage tests are to be carried	
(9) The high voltage levels specified in Table 8.2.6 are to	out after the test.	Current (8) to (9)
	14/01	

Amended	Original	Remarks
 be applied for a period of 1 <i>minute</i> between live parts and frames of rotating machines, with those cores and windings not undergoing testing connected to such frames (see <i>IEC</i> 60034-1:2017). Furthermore, where those temperature rise tests specified in (5) above are applied, high voltage tests are to be carried out after the test. (10) No-load tests of rotating machines are to be carried out. Machines are to be operated at no load and rated speed whilst being supplied at rated voltage and frequency when used as a motor, or are to be driven by a suitable means and excited to give rated terminal voltage when used as a generator. During such tests, machine vibrations and bearing lubrication system operations are to be checked and confirmed to be in 	 (9) Immediately after those high voltage tests specified in (8) above have been performed, the insulation resistance of such rotating machines is to be measured in accordance with Table 8.2.7 and all values are not to be less than any of those specified in Table 8.2.7. In addition, during such measuring, temperatures of rotating machines are to be near operating temperature. However, in cases where this is difficult, appropriate methods of calculation may be used instead. (10) Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current method. 	Current (11) to (10)
(11) <u>Verification of degree of protection (IP) is to be as</u> specified in <i>IEC</i> 60034-5:2000+AMD1:2006.	(11) No-load tests of rotating machines are to be carried	New (11) URE13(Rev.3)Corr.1 4.11 (12) No change
 (12) Upon completion of the above tests, machines which have sleeve bearings are to be opened and examined in cases where deemed necessary by the Society. (13) Rotating machines with commutators are to work with fixed brushes settings from no loads to 50 % 	(12) Upon completion of the above tests, machines which have sleeve bearings are to be opened and examined	Current (3) to (13)

Amended-Original Requ	uirements Compariso	n Table (Tests for	Rotating Machines)

		Amended		•	Origin	nal	,	Remarks	3
overl	oads	without any harmful sparkir	<u>ng.</u>						
		Tab	le 8.2.5 Tests for	Rotating Machir	nes			(Amended)	or
			Generators		Motors			described	
			First generator	Other generators	First motor	Other motors			
١	No.	Tests	produced in a	produced in a series	produced in a series	produced in a series		clarification	
			series of identical	of identical type	of identical type	of identical type			
			type units (1)	units ⁽²⁾	units ⁽¹⁾	units ⁽²⁾			
1		Examination of the technical							
		documentation, as appropriate and	х	х	х	х			
		visual examination							
2	2	Insulation resistance measurement	Х	Х	Х	Х			
3		Winding resistance measurement	х	х	х	х			
4		Verification of the voltage regulation system ⁽⁷⁾	х	x ⁽³⁾					
5	5	Rated load test and temperature rise measurements	х	<u>X⁽⁸⁾</u>	х	<u>X⁽⁸⁾</u>			
6	5	Overload/overcurrent test	х	x ⁽⁴⁾	х	x ⁽⁴⁾			
7		Verification of steady short circuit conditions ⁽⁵⁾	х	<u>X⁽⁸⁾</u>					
8	3	Overspeed test	х	х	X ⁽⁶⁾	X ⁽⁶⁾			
9)	High voltage tests	х	х	х	х			
1	0	No-load test	х	х	х	х			
1	1	Verification of degree of protection	Х		Х				
1	2	Verification of bearings	х	х	х	х			
Notes:		ests on prototype machine or tests on a			X	X			
	-	port of machines produced as part of a	• •	units are to contain the	e manufacturer's serial	number of the machine	which has been		
		sted and the corresponding test results.							
	•	unctional tests of voltage regulator sys							
		pplicable to machines with rated output			es.				
		ation of steady short circuit condition	applies to synchronous	s generators only.					
		plicable to squirrel cage motors.							
		plicable to D.C. generators.							
(8)]	The tes	sts may be omitted subject to Society a	pproval for each rotati	ng machine which is p	roduced in series of id	entical type units.			

		is comparison facto (fosts for frotating fractimes)	
	Amended	Original	Remarks
	EFFECTIVE DATE AND APPLICATION		
1.	The effective date of the amendments is 27 June		
	2024.		

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND	GUIDANCE FOR THE SURVEY AND	
CONSTRUCTION OF STEEL SHIPS	CONSTRUCTION OF STEEL SHIPS	
Part GF SHIPS USING LOW- FLASHPOINT FUELS	Part GF SHIPS USING LOW- FLASHPOINT FUELS	
Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS USING LOW-FLASHPOINT FUELS	Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS USING LOW-FLASHPOINT FUELS	
Chapter 3 FUEL PUMPS	Chapter 3 FUEL PUMPS	
3.3 Materials, Construction and Strength	3.3 Materials, Construction and Strength	
3.3.2 Construction and Installation 3 The electrical insulation materials and insulated cables of the driving motors of submerged type pumps are to sufficiently withstand the service environment, and the insulation resistance of the motor is not to be less than the value specified in 2.4.15 (3), Part H of the Rules .	 3.3.2 Construction and Installation 3 The electrical insulation materials and insulated cables of the driving motors of submerged type pumps are to sufficiently withstand the service environment, and the insulation resistance of the motor is not to be less than the value specified in 2.4.15-10., Part H of the Rules. 	To change of entry of 2.4.15, Rules of Part H

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND	GUIDANCE FOR THE SURVEY AND	
CONSTRUCTION OF STEEL SHIPS	CONSTRUCTION OF STEEL SHIPS	
Part HELECTRICAL INSTALLATIONS	Part HELECTRICAL INSTALLATIONS	
H2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN	H2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN	
H2.4 Rotating Machines	H2.4 Rotating Machines	
 H2.4.15 Shop Tests 3 The wording "separately specified procedures" referred to in 2.4.15(5), Part H of the Rules means as follows: 4 (Omitted) 5 In those commutation tests specified in 2.4.15(<u>11</u>), Part H of the Rules, any sparks arising between commutator segments and brushes in <u>D.C.</u> machines are categorized into eight types as shown in Fig. 2.4.15-3, and categories 5 through 8 are deemed to be harmful. 	 H2.4.15 Shop Tests 3 The wording "separately specified procedures" referred to in 2.4.15(7), Part H of the Rules means as follows: 4 (Omitted) 5 In those commutation tests specified in 2.4.15(3), Part H of the Rules, any sparks arising between commutator segments and brushes in <u>D.C.</u> machines are categorized into eight types as shown in Fig. 2.4.15-3, and categories 5 through 8 are deemed to be harmful. 	To change of entry of 2.4.15, Rules of Part H

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND	GUIDANCE FOR THE SURVEY AND	
CONSTRUCTION OF STEEL SHIPS	CONSTRUCTION OF STEEL SHIPS	
Part N SHIPS CARRYING LIQUEFIED GASES IN BULK	Part N SHIPS CARRYING LIQUEFIED GASES IN BULK	
Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK	Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK	
Chapter 3 CARGO PUMPS	Chapter 3 CARGO PUMPS	
3.3 Materials, Construction and Strength	3.3 Materials, Construction and Strength	
3.3.2 Construction and Installations 3 The electrical insulation materials and insulated cables of the driving motors of submerged type pump are to sufficiently withstand the service environment, and the insulation resistance of the motor is not to be less than the value specified in 2.4.15(3), Part H of the Rules.	 3.3.2 Construction and Installations 3 The electrical insulation materials and insulated cables of the driving motors of submerged type pump are to sufficiently withstand the service environment, and the insulation resistance of the motor is not to be less than the value specified in 2.4.15-10., Part H of the Rules. 	To change of entry of 2.4.15, Rules of Part H

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND	GUIDANCE FOR THE SURVEY AND	
CONSTRUCTION OF	CONSTRUCTION OF	
INLAND WATERWAY SHIPS	INLAND WATERWAY SHIPS	
Part 8 ELECTRICAL INSTALLATIONS	Part 8 ELECTRICAL INSTALLATIONS	
Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN	Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN	
2.4 Rotating Machines	2.4 Rotating Machines	
 2.4.15 Shop Tests 3 The wording "separately specified procedures" referred to in 2.4.15(5), Part 8 of the Rules means as follows: 4 (Omitted) 5 In those commutation tests specified in 2.4.15(<u>11</u>), Part 8 of the Rules, any sparks arising between commutator segments and brushes in <u>D.C.</u> machines are categorized into eight types as shown in Fig. 8.2.4.15-3, and categories 5 through 8 are deemed to be harmful. 	 2.4.15 Shop Tests 3 The wording "separately specified procedures" referred to in 2.4.15(7), Part 8 of the Rules means as follows: 4 (Omitted) 5 In those commutation tests specified in 2.4.15(3), Part 8 of the Rules, any sparks arising between commutator segments and brushes in <u>D.C.</u> machines are categorized into eight types as shown in Fig. 8.2.4.15-3, and categories 5 through 8 are deemed to be harmful. 	To change of entry of 2.4.15, Rules of Part H
EFFECTIVE DATE AND APPLICATION		
1. The effective date of the amendments is 27 June 2024.		