



THE ELECTRICAL WIRING (X-RAY) REGULATIONS 1944

C. L. N. NEWALL, Governor-General

ORDER IN COUNCIL

At the Government Buildings at Wellington, this 15th day of
November, 1944

Present :

THE HON. W. NASH PRESIDING IN COUNCIL

PURSUANT to the Public Works Act, 1928, His Excellency the Governor-General, acting by and with the advice and consent of the Executive Council, doth hereby make the following regulations.

REGULATIONS

PART I.—GENERAL

1. These regulations may be cited as the Electrical Wiring (X-ray) Regulations 1944.
2. These regulations shall come into force on the 1st day of December, 1944.
3. In these regulations, unless inconsistent with the context,—
 - “District Medical Officer” means the officer of the Health Department for the time being discharging the duties of Medical Officer of Health in the locality where any x-ray installation is situate :
 - “Portable installation” means an x-ray installation that is—
 - (a) Capable of being readily moved from place to place ;
 - and
 - (b) Capable of ready connection to and disconnection from a source of electrical energy by means of a flexible cord and detachable plug or similar device :
 - “X-ray installation” and “installation” mean an electrical installation used for the generation of x-rays, and include all component parts of an installation such as generators, transformers, x-ray tubes, rectifiers, condensers, conductors, controlling and indicating apparatus, cooling-devices, timers, and other components collectively and every one and more of them respectively, and also include a portable installation.
4. In these regulations, unless inconsistent with the context, terms defined in the Electrical Wiring Regulations 1935 shall have the meanings assigned to them by those regulations.
5. Where by or under these regulations any apparatus, device, or article is required to be provided there shall be deemed to be imposed a further requirement that it shall at all times be maintained and kept in good, sound, clean, and efficient repair, order, and condition with all necessary repairs and replacements.

6. A notice given under these regulations to the person appearing to be in possession of any x-ray installation shall be binding on all persons then or at any time thereafter in possession of that installation.

7. No person shall manufacture for sale or sell or offer for sale, and no person shall install or cause or permit to be installed or assist to install on any premises, any installation—

- (a) Which does not comply with the requirements of these regulations relating to such an installation ; or
- (b) Which is not of the character specified by these regulations in respect of such an installation ; or
- (c) In a manner contrary to these regulations.

8. No person shall use or maintain, or cause or permit to be used or maintained, on any premises any installation—

- (a) Which does not comply with the requirements of these regulations relating to such an installation ; or
- (b) Which is not of the character specified by these regulations in respect of such an installation ; or
- (c) In a manner contrary to these regulations.

9. No person shall knowingly continue to use or maintain, or cause or permit to continue to be used or maintained, any installation if for any reason such installation has ceased to comply with the requirements of these regulations relating to such an installation or to be of the character specified by these regulations in respect of such an installation.

10. Except as hereinafter provided, compliance with these regulations shall not excuse any person from non-compliance with the requirements of the Electrical Wiring Regulations 1935 and the Electrical Supply Regulations 1935.

PART II.—APPLICATION, MODIFICATION, AND EXEMPTION

Application

11. These regulations shall apply to x-ray installations, irrespective of the source from which their electrical energy is obtained.

12. Except as provided in the two next succeeding regulations hereof, these regulations shall not apply—

- (a) To any x-ray installation other than a portable installation if such installation was used, installed, or in process of installation in any premises prior to the enactment of these regulations, but so long only as the same is used only in the premises where it was used, installed, or in process of installation at the date of enactment of these regulations :
- (b) To any portable installation which was in regular use at the date of enactment of these regulations, but so long only as the same is used under the conditions and circumstances under which it was used immediately prior to the enactment of these regulations.

13. For the purposes of the last preceding regulation every addition to or alteration of an existing installation shall be deemed to be a new installation, and the provisions of these regulations shall apply thereto and to all work done in connection with such addition or alteration.

14. Nothing in these regulations shall be deemed to prohibit the sale, installation, or use of any hitherto unused x-ray installation which is proved to have been at the date of enactment of these regulations situate in New Zealand, or in transit to New Zealand, or the subject of an irrevocable contract for purchase made in New Zealand, and which is substantially free from electrical hazard.

15. Notwithstanding anything hereinbefore contained, the Director-General of Health, acting on the advice of the Chief Electrical Engineer, may at any time after the 1st day of January, 1948, by notice in writing, direct that on and after a date to be stated in the notice, being not less than one year after the day on which the notice is given, all x-ray installations, or any one or more x-ray installations or kinds of x-ray installation to which these regulations would not otherwise apply, shall thenceforth be subject to these regulations, and such notice shall be sufficiently given if published in the *Gazette* or if served upon the person appearing at the time of service to be in possession of an installation sought to be affected thereby.

Modification

16. In the case of any installation where the Director-General of Health and the Chief Electrical Engineer are satisfied that strict compliance with any requirement of these regulations would involve expenditure disproportionate to the degree of freedom from electrical hazard to be secured by such compliance and that compliance with a modified requirement would secure reasonable freedom from electrical hazard, the Director-General of Health may, by notice in writing, modify any such requirement accordingly in the case of that installation.

17. When a requirement is modified under the last preceding regulation the modification may comprise such conditions as to method of use of the installation or other conditions, whether of the same kind or not, as the Director-General of Health, acting on the advice of the Chief Electrical Engineer, thinks fit to impose.

18. Any person committing a breach of a requirement modified under Regulation 16 hereof, or of any condition comprised therein, commits a breach of these regulations.

19. Any notice given under Regulation 16 hereof may be withdrawn by not less than one year's notice in writing in that behalf by the Director-General of Health, acting on the advice of the Chief Electrical Engineer, given to the person appearing at the time of service of such last-mentioned notice to be in possession of the installation to which the notice relates.

20. Before entertaining any application for a notice under Regulation 16 hereof the Director-General of Health may require from the person seeking the issue of the notice a full statement in writing of the reason why a modification is desired, and the nature thereof, and a certificate in writing from an engineer in the service of any supply authority by which a supply of electrical energy for use in the installation is given or intended to be given, to the effect that the application is a reasonable one and that in his opinion the modification desired will not lead to a serious increase in the electrical hazard.

Exemption

21. In the case of any installation on premises to be used exclusively for one or more of the purposes of experiment, testing, demonstration, and research the Director-General of Health, acting on the advice of the Chief Electrical Engineer, may, by notice in writing, exempt such installation or premises from the requirements of these regulations or any of them, and such exemption may be for a specified period but subject to revocation as hereinafter provided, and may be made subject to such conditions as the Director-General of Health, acting on the advice of the Chief Electrical Engineer, thinks fit to impose.

22. Any person failing to comply with any condition imposed in an exemption granted under the last preceding regulation commits a breach of these regulations.

23. Any exemption granted under Regulation 21 hereof, whether granted for a specified period or not, may at any time be withdrawn by notice in writing in that behalf by the Director-General of Health, acting on the advice of the Chief Electrical Engineer, given to the person appearing at the time of service of such last-mentioned notice to be in charge of the installation or premises to which the exemption relates.

24. The person from time to time for the time being in charge of the installation or premises to which any exemption granted under Regulation 21 hereof relates shall provide adequate switching-arrangements so that live terminals and conductors need not be handled, and shall provide adequate protective apparatus to take care of short circuits and overload.

25. The person from time to time for the time being in charge of the installation or premises to which any exemption granted under Regulation 21 hereof relates shall provide a notice warning against the danger of touching live conductors and a notice fully describing the Schaeffer prone pressure method of resuscitation in case of electric shock, and shall at all times cause a copy of each of the said notices to be prominently displayed in the interior of the premises and within sight of every installation therein.

26. It shall not be necessary to the validity of any notice given under this Part of these Regulations that the opinion or advice of the Chief Electrical Engineer be referred to therein or that the Chief Electrical Engineer shall join in giving the notice.

PART III.—NOTIFICATION

27. Within sixty days after the date of coming into force of these regulations every person who at that date is in possession of any x-ray installation then in use or available for use shall supply, in triplicate, to the District Medical Officer a statement in writing setting out with regard to such installation the following information:—

- (a) The address of the premises where the installation is situate ; and
- (b) The purpose for which such installation is used or (as the case may be) capable of being used (*e.g.*, for a diagnostic, therapeutic, or industrial purpose) ; and
- (c) In the case of an installation other than a portable installation, the approximate date when the installation was originally installed and of every subsequent alteration or addition : and
- (d) A short technical description of the installation, including—
 - (i) The name of the maker of the apparatus or its trade name ; and
 - (ii) Its maximum rating in kilovolts and milliamps ; and
 - (iii) Whether it is self-rectified, mechanically rectified, or valve-rectified ; and
- (e) The name of any electrical supply authority by which a supply of electrical energy for use in the installation is given or intended to be given.

28. Every person who at any time after the date of coming into force of these regulations is in possession of any x-ray installation which is in use or available for use and which has not been the subject

of a statement made under the last preceding regulation hereof or a previous statement made under this regulation shall supply, in triplicate, to the District Medical Officer a statement in writing setting out the matters prescribed in the last preceding regulation.

29. Every person liable to comply with the last preceding regulation shall comply therewith within seven days after first coming into possession of the installation, and if he does not so comply shall at all times until he does so comply be under a continuing duty of compliance therewith.

30. A District Medical Officer receiving any statement made under this Part of these regulations shall deliver one copy thereof to the Director-General of Health and one copy to any electrical supply authority by which a supply of electrical energy for use in the installation is given or intended to be given.

PART IV.—MATERIALS, DESIGN, AND CONSTRUCTION

Conductors

31. Every conductor and every component which attains extra-high voltage while exposed to the air shall be of the coronaless type, without sharp edges or points, and rounded to a curve with a radius of not less than quarter of an inch.

32. All permanent overhead conductors shall be constructed of non-ferrous metal or non-rusting metal rods or tubes of not less than half an inch in diameter.

Strength of Supports

33. Every support of a component permanently mounted overhead shall be capable of withstanding a dead-weight load of 50 lb. avoirdupois in excess of its normal load.

34. Every readily movable component which is normally supported by means of a counterweight and cable (such as x-ray tubes in their protective enclosure) shall be provided with a sufficiently strong mechanical safety-catch so designed as to prevent such component or counterweight from dropping more than one-fifth of an inch in case of failure, breakage, or displacement of the cable.

Transformers

35. Every transformer which supplies extra-high voltage for the generation of x-rays shall comply with the requirements of British Standard Specification No. 326 (or its equivalent) and shall where the Chief Electrical Engineer, by notice in writing given to the person appearing to be in possession of the installation, so requires, be fitted with approved drying-traps.

PART V.—CONTROL

36. (a) Every x-ray installation shall incorporate a readily accessible and distinctly marked quick-acting master-switch in the primary supply circuit which in the "off" position shall completely disconnect the x-ray installation from every source from which electrical energy is available.

(b) Every such master-switch shall be held in the "off" position by spring action or by gravity so as to prevent accidental connection with the primary supply circuit.

37. (a) Every foot-switch or hand-switch used for the timing of exposures for radiographic, fluoroscopic, or fluorographic purposes shall be so constructed and arranged that it will return to the "open" position when the operator removes the pressure of his foot or hand, as the case may be.

(b) If any such switch operates through a relay, such relay shall "open" upon release of such switch.

38. No switch or circuit-breaker, no fuse-link, and no trip-coil shall be included in any neutral conductor or earthed conductor of any x-ray installation in such a manner as will permit such conductor to be opened before or closed after the corresponding live conductors, but this requirement shall not prohibit the provision of an isolating-link for testing purposes.

39. (a) Every x-ray installation shall be provided with a quick-acting magnetic overload circuit-breaker in the primary supply circuit which in the "off" position completely disconnects the x-ray installation from any source from which electrical energy is available.

(b) The amperage of the tripping current shall be clearly indicated on the circuit-breaker.

(c) Circuit-breakers on x-ray installations used for medical diagnostic purposes shall have the tripping current adjusted to a 40-per-cent. overload in their primary supply circuit based on the maximum working voltage and current.

(d) Circuit-breakers on x-ray installations used for any other purpose shall have the tripping current adjusted to 20-per-cent. overload in their primary supply circuit based on the maximum working voltage and current.

40. Where an x-ray installation is connected with a source of electrical energy by means of a detachable plug the plug shall be non-reversible.

PART VI.—SIGNALS

41. Automatic visual indicating-devices shall be provided by means of conspicuous, separate, and distinctive warning-signals to indicate—

(a) When the x-ray installation is connected to its primary source of supply; and

(b) When the x-rays are generated by an x-ray tube.

42. The said automatic visual indicating-devices shall be provided and shall be permanently erected in a conspicuous position—

(a) In every room from which an x-ray installation can be controlled; and

(b) In every room in which an x-ray tube is connected as part of an installation.

PART VII.—PROTECTION

43. (a) All readily accessible components and controls of every x-ray installation, and every cooling-device (such as water or oil coolers) used with such installation (hereinafter collectively called components), which can attain a potential difference to earth in excess of medium voltage shall be permanently covered by protective enclosures so arranged that it is impossible for any person to make accidental contact with any component while there exists a potential difference between such component and earth, whether under normal operating conditions or when any insulation provided by or within such enclosures breaks down.

(b) All readily accessible metal parts of such protective enclosures shall be permanently earthed.

(c) No such protective enclosure shall be removable without determined use of force or the application of appropriate tools.

44. The protection provided by or within such enclosure shall be in accordance with the requirements of Regulations 45 to 49 hereof, both inclusive.

45. Every protective enclosure shall be substantially constructed and shall consist of—

(a) An earthed conductor (such as a metal tank, metal-covered container, or metal sheathing) permanently surrounding the component; or

(b) A separate room; or

(c) A barrier consisting of an earthed metal screen or grid with a mesh area of not more than one-half inch square; or

(d) A barrier consisting of insulating-material.

46. Where the protective enclosure consists of a separate room or a barrier the insulating-material provided by or within such enclosure shall be capable of withstanding—

(a) Twice the maximum potential to earth attained by any component; or

(b) Where no point of the generator is earthed, twice the working potential of the x-ray installation.

47. (a) Where the protective enclosure consists of an earthed conductor such conductor shall completely surround the component except for such area as is necessary to permit the passage of an x-ray beam generated within the enclosure.

(b) The area provided for the passage of the x-ray beam shall be protected in accordance with the requirements of Regulation 43 hereof and, so far as applicable, Regulation 45 hereof.

(c) Readily accessible conductors of the "shock-proof cable" type for a working voltage capable of exceeding 650 volts shall be adequately insulated, cotton- or fabric-covered, metal-sheathed, flexible cable of ample mechanical strength to withstand bending and flexing without breaking the conductor or fracturing the insulation or covering. The insulation shall be capable of withstanding 1.25 times the peak working voltage applied for a period of ten minutes. The outer metal sheathing shall be permanently earthed.

48. (a) Where the protective enclosure consists of a separate room or where a barrier can be temporarily removed in parts or in its entirety for cleaning or inspection purposes there shall be provided a switch so arranged that the primary circuit of the x-ray installation will immediately be disconnected from its source of supply of electrical energy when the entrance of the room is opened or any part of the barrier is removed.

(b) It shall not be possible without the determined use of force or the application of appropriate tools to close the switch except from outside the enclosure when the entrance is closed or the barrier is restored.

(c) If such enclosure contains any condenser which attains a potential exceeding extra-low voltage a device shall be installed automatically to connect to earth all electrodes of such condenser or to discharge the condenser before the interior of the enclosure becomes accessible.

49. Where air is used as the only insulating medium within a protective enclosure no part of such enclosure shall be placed nearer to any high voltage or extra-high voltage component than the respective distance specified according to the constructive voltage of the

component in the table subjoined to this regulation, and for the purposes of the said table and this regulation the constructive voltage of a component shall be deemed to be—

- (a) Twice the maximum potential to earth attained by any component; or
- (b) Where no point of the component is earthed, twice the working potential of the component.

TABLE OF SPARK-GAPS

Needle-point Spark-over Voltages at 25° C. and 760 mm. Barometric Pressure

Constructive Voltage of Component not exceeding			Minimum Distance.		Constructive Voltage of Component not exceeding			Minimum Distance.	
Kilovolts			cm.	Inches.	Kilovolts			cm.	Inches.
5	..	..	0·42	0·17	120	..	..	19·8	7·81
10	..	..	0·85	0·33	130	..	..	22·0	8·65
15	..	..	1·30	0·51	140	..	..	24·1	9·48
20	..	..	1·75	0·69	150	..	..	26·1	10·3
25	..	..	2·20	0·87	160	..	..	28·1	11·1
30	..	..	2·69	1·06	170	..	..	30·1	11·9
35	..	..	3·20	1·26	180	..	..	32·0	12·6
40	..	..	3·81	1·50	190	..	..	33·9	13·3
45	..	..	4·49	1·77	200	..	..	35·7	14·0
50	..	..	5·20	2·05	210	..	..	37·6	14·8
60	..	..	6·81	2·68	220	..	..	39·5	15·5
70	..	..	8·81	3·47	230	..	..	41·4	16·3
80	..	..	11·1	4·36	240	..	..	43·3	17·0
90	..	..	13·3	5·23	250	..	..	45·2	17·8
100	..	..	15·5	6·10	300	..	..	54·7	21·6
110	..	..	17·7	6·96					

PART VIII.—MISCELLANEOUS

50. No person shall be actively engaged in the use or application of x-rays who is not proficient in the proper treatment of electrical injury.

51. Without prejudice to the generality of Regulation 10 hereof, every x-ray installation, and all appliances in circuit or in electrical connection therewith, shall be installed in accordance with the requirements of the Electrical Wiring Regulations 1935, except so far as such requirements are by these regulations expressly or by necessary implication varied or modified, and shall be inspected in accordance with the requirements of those regulations.

52. It shall be a condition of every license granted to an electrical supply authority that such electrical supply authority shall not, without the permission in writing of the Chief Electrical Engineer, continue to supply electrical energy for use in an x-ray installation if such installation is not installed or not maintained in accordance with these regulations, or if the Chief Electrical Engineer notifies the authority in writing that in his opinion such installation is not so installed or not so maintained.

53. Any person committing a breach of these regulations shall be liable to a fine not exceeding £20.

C. A. JEFFERY,
Clerk of the Executive Council.

Issued under the authority of the Regulations Act, 1936.

Date of notification in *Gazette*: 16th day of November, 1944.

These regulations are administered in the Public Works Department.