

CONTENTS

1.	INTRODUCTION	1
1.1.	Background	1
1.2.	Objective and scope	2
2.	CATEGORIES AND CHARACTERISTICS OF INSTRUMENTS	2
3.	GENERAL COMMENTS ON TEST PROCEDURES	6
4.	FIXED RPMS	7
4.1.	Applications	7
4.2.	Characteristics	7
4.3.	Radiation portal monitor	9
4.3.1.	Pedestrian monitors	9
4.3.2.	Vehicle and rail monitors	17
4.4.	Common technical and functional requirements	25
4.4.1.	Overload characteristics	25
4.4.2.	Operational availability	26
4.4.3.	Occupancy sensor requirements	26
4.5.	Environmental and electrical requirements	26
4.5.1.	Ambient climate	26
4.5.2.	Mains power operation	27
4.6.	Electromagnetic interference requirements	28
4.6.1.	External magnetic fields	28
4.6.2.	Radiated electromagnetic fields	29
4.6.3.	Conducted disturbances induced by bursts and RFs	29
4.6.4.	Surges and oscillatory waves	30
4.6.5.	Electrostatic discharge	31
4.7.	Mechanical requirements	31
4.7.1.	Mechanical shocks	32
5.	PERSONAL RADIATION DETECTORS	33
5.1.	Application	33
5.2.	Characteristics	33
5.3.	Essential and desirable functional features	35

5.3.1. Essential features	35
5.3.2. Desirable features	35
5.4. Technical and functional performance specifications and testing	36
5.4.1. False alarm rate	36
5.4.2. Sensitivity to gamma radiation	36
5.4.3. Sensitivity to neutron radiation	37
5.4.4. Gamma sensitivity of the neutron detector	37
5.4.5. Alarm settings	38
5.4.6. Audible indication rate for searching ('alarm rate') ..	38
5.4.7. Gamma dose rate indication	38
5.4.8. Physical dimensions	39
5.4.9. Battery life	39
5.4.10. Environmental and EMI	39
5.4.11. Ruggedness	40
6. HAND HELD RIDS	40
6.1. Application	40
6.2. Characteristics	40
6.3. Essential functional features	42
6.3.1. Generic requirements	42
6.3.2. Detector	42
6.3.3. Display and visual indications	43
6.3.4. Display indications during radionuclide identification	43
6.3.5. Acoustic signals	44
6.3.6. Spectrometer amplifier/MCA requirements	44
6.3.7. Internal memory and PC link	44
6.3.8. Power supply	45
6.4. Technical and functional performance specifications and testing	45
6.4.1. Gamma energy range	45
6.4.2. Sensitivity to gamma radiation in search mode	46
6.4.3. Test of the hardware performance of the RID gamma spectrometer	46
6.4.4. Sensitivity to neutron radiation	48
6.4.5. Gamma sensitivity of neutron detector	49
6.4.6. Safety alarm setting	50
6.4.7. Gamma dose rate indication	50
6.4.8. Over range indication	51

6.4.9. False alarm rate for gamma and neutron radiation	51
6.4.10. Environmental requirements	51
6.4.11. Temperature shock	51
6.4.12. Electrostatic discharge	52
6.4.13. Radiofrequency	52
6.4.14. Radiated emissions	53
6.4.15. Conducted immunity	54
6.4.16. Magnetic fields	54
6.4.17. Battery life	55
6.4.18. Radionuclide identification	55
6.4.19. Increase gamma background requirement	59
6.4.20. Interfering ionizing radiation (beta) requirement	59
6.4.21. False identification requirement	60
6.4.22. Interference from surrounding material requirements	60
6.4.23. Identification of radioactive material typically causing innocent/nuisance alarms due to NORM	61
6.4.24. Physical dimensions	61
6.4.25. Vibration	61
6.4.26. Mechanical shock	62
6.4.27. Moisture resistance	62
7. NEUTRON SEARCH DETECTORS	63
7.1. Application	63
7.2. Characteristics	63
7.3. Essential functional requirements	64
7.3.1. Generic requirements	64
7.3.2. Detector hardware and software	64
7.3.3. Acoustic and visual signals	65
7.3.4. Internal memory and PC link	66
7.3.5. Power supply	66
7.4. Technical and functional performance specifications and testing	66
7.4.1. Neutron sensitivity	66
7.4.2. Safety alarm	68
7.4.3. Gamma insensitivity	68
7.4.4. Alarm setting	68
7.4.5. Search mode	68
7.4.6. Physical dimensions	69
7.4.7. Ruggedness	69

8. DOCUMENTATION REQUIREMENTS	69
8.1. Technical specifications	70
8.2. Operation and maintenance manuals	70
8.3. Initial and periodic test procedure	70
8.4. Acceptance test report	70
REFERENCES	71
ANNEX I: QUANTITIES AND UNITS	73
ANNEX II: CRITERIA BASED ON STATISTICAL PROBABILITIES	74
ANNEX III: CONVERSION TABLES FOR ACTIVITY AND DOSE RATE OF SPECIFIED SOURCES	76
ANNEX IV: MINIMUM SET OF REFERENCE TEST SOURCES SUITABLE FOR ALL TEST PROCEDURES	78
GLOSSARY	79