

# ISO/TR 15497:2000-11 (E)

## Road vehicles - Development guidelines for vehicle based software

---

### Contents

Page

1.	Introduction.....	1
1.1	Statement of mission and objectives .....	1
1.2	Benefits to the end customer.....	1
1.3	The MISRA consortium.....	1
1.4	Background.....	2
1.5	Scope and uses of the Guidelines.....	3
1.5.1	Scope.....	3
1.5.2	Uses .....	3
1.6	Fundamental concepts .....	5
2.	Definition of terms.....	7
2.1	Definitions .....	7
2.2	List of abbreviations .....	7
3.	Software lifecycle .....	8
3.1	Project planning .....	8
3.1.1	Project definition .....	8
3.1.2	Lifecycle plans.....	9
3.1.3	Planning for verification and validation.....	9
3.1.4	Assessment .....	13
3.1.5	Reuse.....	14
3.2	Integrity .....	14
3.2.1	Introduction.....	14
3.2.2	Safety analysis.....	15
3.2.3	Human factors in safety analysis .....	18
3.2.4	Development approaches.....	19
3.3	Requirements specification .....	22
3.3.1	Whole vehicle architecture.....	22
3.3.2	Vehicle control systems .....	25
3.3.3	Noise and electromagnetic compatibility .....	28
3.3.4	Verification and validation of software requirements .....	30
3.3.5	Tools and techniques for requirements specification.....	32
3.4	Design.....	33
3.4.1	Real-time implications .....	33
3.4.2	Floating point arithmetic .....	36
3.4.3	Modelling.....	37
3.4.4	Optimization and adaptive control .....	38
3.4.5	Communications and multiplexing.....	38
3.4.6	On-board diagnostics .....	41
3.4.7	System security.....	43
3.4.8	Fault management.....	43
3.4.9	Design for verification and validation .....	45
3.4.10	Tools and techniques for design .....	46
3.5	Programming .....	47
3.5.1	Codes of practice .....	47
3.5.2	Verification and validation of code.....	48
3.5.3	Programming tools and techniques .....	48
3.6	Testing.....	49
3.6.1	General .....	49
3.6.2	Dynamic test .....	49
3.6.3	Integration test.....	49
3.6.4	System test .....	51
3.6.5	Tools and techniques for testing.....	51
3.7	Product support.....	52
3.7.1	Off-board diagnostics .....	52

3.7.2	Software maintenance.....	53
4.	Software quality planning .....	55
4.1	Management responsibilities .....	55
4.2	Education and experience .....	56
4.3	Human factors in software development .....	56
4.3.1	Introduction .....	56
4.3.2	Teams and organizational structure .....	57
4.3.3	Individual differences and job design .....	57
4.3.4	Human error management .....	58
4.3.5	The physical environment .....	58
4.4	Quality assurance .....	59
4.4.1	Standards and accreditation .....	59
4.4.2	Checklists .....	59
4.4.3	Assessment of compliance .....	59
4.4.4	Changes during production.....	60
4.4.5	Software process metrics .....	60
4.5	Documentation requirements.....	62
4.6	Subcontracting .....	63
4.6.1	Introduction .....	63
4.6.2	Definitions .....	63
4.6.3	Technical considerations.....	65
4.6.4	Commercial considerations.....	67
5.	Emerging technologies .....	70
5.1	General.....	70
5.2	Neural networks .....	70
5.3	Object orientation .....	71
5.4	Fuzzy logic.....	71
5.5	Formal mathematical methods.....	72
6.	References.....	73
7.	Index.....	76