MISRA-C:2012 Standards Model Summary for C / C++

The LDRA tool suite® is developed and certified to BS EN ISO 9001:2015, TÜV SÜD and SGS-TÜV Saar.

This information is applicable to version 9.8.5 of the LDRA tool suite®.
It is correct as of 22nd October 2020.

Compliance is measured against
"MISRA C:2012 Guidelines for the use of the C language in critical systems (Third Edition, first revision), MISRA C:2012 Amendment 2 Updates for ISO/IEC 9899:2011 Core functionality"
2019, 2020

Further information is available at http://www.misra.org.uk

Classification	Enhanced Enforcement	Fully Implemented	Partially Implemented	Not yet Implemented	Not statically Checkable	Total
Mandatory	0	12	4	0	0	**16**
Required	10	98	10	0	2	**120**
Advisory	7	27	5	0	0	**39**
Total	**17**	**137**	**19**	**0**	**2**	**175**

MISRA-C:2012 Standards Model Compliance for C / C++

Rule	Classification	Rule Description	LDRA Standard	LDRA Standard Description
D.1.1	Required	Any implementation-defined behaviour on which the output of the program depends shall be documented	69 S	#pragma used.
			584 S	Remainder of % op could be negative.
D.2.1	Required	All source files shall compile without any compilation errors		
D.3.1	Required	All code shall be traceable to documented requirements		
D.4.1	Required	Run-time failures shall be minimised	43 D	Divide by zero found.
			45 D	Pointer not checked for null before use.
			115 D	Copy length parameter not checked before use.
			123 D	File pointer not checked for null before use.
			127 D	Local or member denominator not checked before use.
			128 D	Global pointer not checked within this procedure.
			129 D	Global file pointer not checked within this procedure.
			131 D	Global denominator not checked within this procedure.
			135 D	Pointer assigned to NULL may be dereferenced.
			136 D	Global pointer assigned to NULL may be dereferenced.
			137 D	Parameter used as denominator not checked before use.
			248 S	Divide by zero in preprocessor directive.
			493 S	Numeric overflow.
			494 S	Numeric underflow.
			629 S	Divide by zero found.
			80 X	Divide by zero found.
D.4.2	Advisory	All usage of assembly language should be documented	17 S	Code insert found.
D.4.3	Required	Assembly language shall be encapsulated and isolated	88 S	Procedure is not pure assembler.
D.4.4	Advisory	Sections of code should not be 'commented out'	302 S	Comment possibly contains code.
D.4.5	Advisory	Identifiers in the same namespace with overlapping visibility should be typographically unambiguous	217 S	Names only differ by case.
			67 X	Identifier is typographically ambiguous.

D.4.6	Advisory	typedefs that indicate size and signedness should be used in place of the basic numerical types	90 S	Basic type declaration used.
			495 S	Typedef name has no size indication.
D.4.7	Required	If a function returns error information, then that error information shall be tested	91 D	Function return value potentially unused.
			124 D	Var set by std lib func return not checked before use.
			130 D	Global set by std lib func return not checked before use.
D.4.8	Advisory	If a pointer to a structure or union is never dereferenced within a translation unit, then the implementation of the object should be hidden	104 D	Structure implementation not hidden.
D.4.9	Advisory	A function should be used in preference to a function-like macro where they are interchangeable	340 S	Use of function like macro.
D.4.10	Required	Precautions shall be taken in order to prevent the contents of a header file being included more than once	243 S	Included file not protected with #define.
D.4.11	Required	The validity of values passed to library functions shall be checked		
D.4.12	Required	Dynamic memory allocation shall not be used	44 S	Use of banned function, type or variable.
D.4.13	Advisory	Functions which are designed to provide operations on a resource should be called in an appropriate sequence		
D.4.14	Required	The validity of values received from external sources shall be checked	43 D	Divide by zero found.
			45 D	Pointer not checked for null before use.
			85 D	Filename not verified before fopen.
			86 D	User input not checked before use.
			123 D	File pointer not checked for null before use.
			127 D	Local or member denominator not checked before use.
			128 D	Global pointer not checked within this procedure.
			129 D	Global file pointer not checked within this procedure.
			131 D	Global denominator not checked within this procedure.
			248 S	Divide by zero in preprocessor directive.
			493 S	Numeric overflow.
			494 S	Numeric underflow.
			629 S	Divide by zero found.
			80 X	Divide by zero found.

R.1.1	Required	The program shall contain no violations of the standard C syntax and constraints, and shall not exceed the implementation's translation limits	21 S	Number of parameters does not match.
			145 S	#if has invalid expression.
			323 S	Switch has more than one default case.
			345 S	Bit operator with floating point operand.
			387 S	Enum init not integer-constant-expression.
			404 S	Array initialisation has too many items.
			481 S	Array with no bounds in struct.
			580 S	Macro redefinition without using #undef.
			615 S	Conditional operator has incompatible types.
			646 S	Struct initialisation has too many items.
R.1.2	Advisory	Language extensions should not be used	110 S	Use of single line comment //.
			143 S	Curly brackets used in expression.
			293 S	Non ANSI/ISO construct used.
			632 S	Use of // comment in pre-processor directive or macro defn.
R.1.3	Required	There shall be no occurrence of undefined or critical unspecified behaviour	82 D	fsetpos values not generated by fgetpos.
			83 D	Potentially repeated call to ungetc.
			84 D	No fseek or flush before I/O.
			87 D	Illegal shared object in signal handler.
			89 D	Illegal use of raise in signal handler.
			5 Q	File does not end with new line.
			21 S	Number of parameters does not match.
			44 S	Use of banned function, type or variable.
			64 S	Void procedure used in expression.
			65 S	Void variable passed as parameter.
			113 S	Non standard character in source.
			118 S	main must be int (void) or int (int,char*[]).
			176 S	Non standard escape sequence in source.
			296 S	Function declared at block scope.
			324 S	Macro call has wrong number of parameters.
			335 S	Operator defined contains illegal items.
			336 S	#if expansion contains define operator.
			412 S	Undefined behaviour, \ before E-O-F.
			450 S	Wide string and string concatenated.
			465 S	Struct/union not completely specified.
			482 S	Incomplete structure referenced.
			486 S	Incorrect number of formats in output function.
			487 S	Insufficient space allocated.
			489 S	Insufficient space for operation.
			497 S	Type is incomplete in translation unit.
			573 S	Macro concatenation of uni char names.

			576 S	Function pointer is of wrong type.
			582 S	const object reassigned.
			587 S	Const local variable not immediately initialised.
			589 S	Format is not appropriate type.
			590 S	Mode fault in fopen.
			608 S	Use of explicitly undefined language feature.
			642 S	Function return type with array field.
			645 S	realloc ptr type does not match target type.
			649 S	Use of unallocated flexible array.
			650 S	Flexible array copy ignores last member.
			66 X	Insufficient array space at call.
			70 X	Array has insufficient space.
			71 X	Insufficient space for copy.
			79 X	Size mismatch in memcpy/memset.
R.1.4	Required	Emergent language features shall not be used	44 S	Use of banned function, type or variable.
			130 S	Included file is not permitted.
			15 V	Use of banned keyword.
R.2.1	Required	A project shall not contain unreachable code	28 D	Potentially infinite loop found.
			76 D	Procedure is not called or referenced in code analysed.
			1 J	Unreachable Code found.
			3 J	All internal linkage calls unreachable.
			35 S	Static procedure is not explicitly called in code analysed.
			631 S	Declaration not reachable.
R.2.2	Required	There shall be no dead code	8 D	DD data flow anomalies found.
			65 D	Void function has no side effects.
			105 D	DU anomaly dead code, var value is unused on all paths.
			57 S	Statement with no side effect.
R.2.3	Advisory	A project should not contain unused type declarations	413 S	User type declared but not used in code analysed.
R.2.4	Advisory	A project should not contain unused tag declarations	413 S	User type declared but not used in code analysed.
R.2.5	Advisory	A project should not contain unused macro declarations	628 S	Macro not used in translation unit.
R.2.6	Advisory	A function should not contain unused label declarations	610 S	Label is unused.
R.2.7	Advisory	There should be no unused parameters in functions	1 D	Unused procedure parameter.
			15 D	Unused procedural parameter.
R.3.1	Required	The character sequences /* and // shall not be used within a comment	119 S	Nested comment found.

R.3.2	Required	Line-splicing shall not be used in // comments	611 S	Line splice used in // comment.
R.4.1	Required	Octal and hexadecimal escape sequences shall be terminated	176 S	Non standard escape sequence in source.
R.4.2	Advisory	Trigraphs should not be used	81 S	Use of trigraph.
R.5.1	Required	External identifiers shall be distinct	17 D	Identifier not unique within *** characters.
			61 X	Identifier match in *** chars.
R.5.2	Required	Identifiers declared in the same scope and name space shall be distinct	17 D	Identifier not unique within *** characters.
			61 X	Identifier match in *** chars.
R.5.3	Required	An identifier declared in an inner scope shall not hide an identifier declared in an outer scope	17 D	Identifier not unique within *** characters.
			18 D	Identifier name reused.
			92 S	Duplicate use of a name in an enumeration.
			128 S	Parameter has same name as global variable.
			131 S	Name reused in inner scope.
			61 X	Identifier match in *** chars.
R.5.4	Required	Macro identifiers shall be distinct	384 S	Identifier matches macro name in 31 chars.
			622 S	Macro parameters are not unique within limits.
			61 X	Identifier match in *** chars.
R.5.5	Required	Identifiers shall be distinct from macro names	383 S	Identifier name matches macro name.
			384 S	Identifier matches macro name in 31 chars.
			12 X	Identifier reuse: tag vs macro.
			21 X	Identifier reuse: typedef vs macro.
			34 X	Identifier reuse: proc vs macro.
			37 X	Identifier reuse: persistent var vs macro.
			47 X	Identifier reuse: component vs macro.
			48 X	Identifier reuse: label vs macro (MR).
			50 X	Identifier reuse: var vs macro.
			53 X	Identifier reuse: proc param vs macro.
			57 X	Identifier reuse: macro vs enum constant.
			61 X	Identifier match in *** chars.

R.5.6	Required	A typedef name shall be a unique identifier	112 S	Typedef name redeclared.
			374 S	Name conflict with typedef.
			11 X	Identifier reuse: tag vs typedef.
			16 X	Identifier reuse: typedef vs variable.
			17 X	Identifier reuse: typedef vs label (MR).
			18 X	Identifier reuse: typedef vs typedef.
			19 X	Identifier reuse: typedef vs procedure parameter.
			20 X	Identifier reuse: persistent var vs typedef.
			22 X	Identifier reuse: typedef vs component.
			23 X	Identifier reuse: typedef vs enum constant.
			24 X	Identifier reuse: typedef vs procedure.
R.5.7	Required	A tag name shall be a unique identifier	325 S	Inconsistent use of tag.
			4 X	Identifier reuse: struct/union tag repeated.
			5 X	Identifier reuse: struct vs union.
			6 X	Identifier reuse: struct/union tag vs enum tag.
			7 X	Identifier reuse: tag vs procedure.
			8 X	Identifier reuse: tag vs procedure parameter.
			9 X	Identifier reuse: tag vs variable.
			10 X	Identifier reuse: tag vs label (MR).
			11 X	Identifier reuse: tag vs typedef.
			13 X	Identifier reuse: tag vs component.
			14 X	Identifier reuse: tag vs enum constant.
			15 X	Identifier reuse: persistent var vs tag.
R.5.8	Required	Identifiers that define objects or functions with external linkage shall be unique	1 S	Procedure name reused.
			7 X	Identifier reuse: tag vs procedure.
			15 X	Identifier reuse: persistent var vs tag.
			20 X	Identifier reuse: persistent var vs typedef.
			24 X	Identifier reuse: typedef vs procedure.
			25 X	Identifier reuse: procedure vs procedure param.
			26 X	Identifier reuse: persistent var vs label (MR).
			27 X	Identifier reuse: persist var vs persist var.
			28 X	Identifier reuse: persistent var vs var.
			29 X	Identifier reuse: persistent var vs procedure.
			30 X	Identifier reuse: persistent var vs proc param.
			31 X	Identifier reuse: procedure vs procedure.

			32 X	Identifier reuse: procedure vs var.
			33 X	Identifier reuse: procedure vs label (MR).
			35 X	Identifier reuse: proc vs component.
			36 X	Identifier reuse: proc vs enum constant.
			38 X	Identifier reuse: persistent var vs component.
			39 X	Identifier reuse: persistent var vs enum constant.
R.5.9	Advisory	Identifiers that define objects or functions with internal linkage should be unique	1 S	Procedure name reused.
			7 X	Identifier reuse: tag vs procedure.
			15 X	Identifier reuse: persistent var vs tag.
			20 X	Identifier reuse: persistent var vs typedef.
			24 X	Identifier reuse: typedef vs procedure.
			25 X	Identifier reuse: procedure vs procedure param.
			26 X	Identifier reuse: persistent var vs label (MR).
			27 X	Identifier reuse: persist var vs persist var.
			28 X	Identifier reuse: persistent var vs var.
			29 X	Identifier reuse: persistent var vs procedure.
			30 X	Identifier reuse: persistent var vs proc param.
			31 X	Identifier reuse: procedure vs procedure.
			32 X	Identifier reuse: procedure vs var.
			33 X	Identifier reuse: procedure vs label (MR).
			35 X	Identifier reuse: proc vs component.
			36 X	Identifier reuse: proc vs enum constant.
			38 X	Identifier reuse: persistent var vs component.
			39 X	Identifier reuse: persistent var vs enum constant.
R.6.1	Required	Bit-fields shall only be declared with an appropriate type	73 S	Bit field not signed or unsigned int.
			520 S	Bit field is not bool or explicit integral.
R.6.2	Required	Single-bit named bit fields shall not be of a signed type	72 S	Signed bit field less than 2 bits wide.
R.7.1	Required	Octal constants shall not be used	83 S	Octal number found.
R.7.2	Required	A "u" or "U" suffix shall be applied to all integer constants that are represented in an unsigned type	331 S	Literal value requires a U suffix.
			550 S	Unsuffixed hex or octal is unsigned, add U.
R.7.3	Required	The lowercase character 'l' shall not be used in a literal suffix	252 S	Lower case suffix to literal number.

R.7.4	Required	A string literal shall not be assigned to an object unless the object's type is "pointer to const-qualified	157 S	Modification of string literal.
			623 S	String assigned to non const object.
R.8.1	Required	Types shall be explicitly specified	20 S	Parameter not declared explicitly.
			135 S	Parameter list is KR.
			326 S	Declaration is missing type.
R.8.2	Required	Function types shall be in prototype form with named parameters	37 S	Procedure parameter has a type but no identifier.
			63 S	Empty parameter list to procedure/function.
			135 S	Parameter list is KR.
R.8.3	Required	All declarations of an object or function shall use the same names and type qualifiers	36 D	Prototype and definition name mismatch.
			63 X	Function prototype/defn param type mismatch (MR).
R.8.4	Required	A compatible declaration shall be visible when an object or function with external linkage is defined	36 D	Prototype and definition name mismatch.
			106 D	No prototype for non-static function.
			102 S	Function and prototype return inconsistent (MR).
			103 S	Function and prototype param inconsistent (MR).
			1 X	Declaration types do not match across a system.
			62 X	Function prototype/defn return type mismatch (MR).
			63 X	Function prototype/defn param type mismatch (MR).
R.8.5	Required	An external object or function shall be declared once in one and only one file	60 D	External object should be declared only once.
			110 D	More than one prototype for same function.
			172 S	Variable declared multiply.
R.8.6	Required	An identifier with external linkage shall have exactly one external definition	26 D	Variable should be defined once in only one file.
			33 D	No real declaration for external variable.
			34 D	Procedure name re-used in different files.
			63 D	No definition in system for prototyped procedure.
R.8.7	Advisory	Functions and objects should not be defined with external linkage if they are referenced in only one	27 D	Variable should be declared static.
			61 D	Procedure should be declared static.
R.8.8	Required	The static storage class specifier shall be used in all declarations of objects and functions that have internal linkage	27 D	Variable should be declared static.
			61 D	Procedure should be declared static.
			461 S	Identifier with ambiguous linkage.
			553 S	Function and proto should both be static.
			575 S	Linkage differs from previous declaration.

R.8.9	Advisory	An object should be defined at block scope if its identifier only appears in a single function	25 D	Scope of variable could be reduced.
R.8.10	Required	An inline function shall be declared with the static storage class	612 S	inline function should be declared static.
R.8.11	Advisory	When an array with external linkage is declared, its size should be explicitly specified	127 S	Array has no bounds specified.
R.8.12	Required	Within an enumerator list, the value of an implicitly-specified enumeration constant shall be unique	630 S	Duplicated enumeration value.
R.8.13	Advisory	A pointer should point to a const-qualified type whenever possible	120 D	Pointer param should be declared pointer to const.
R.8.14	Required	The restrict type qualifier shall not be used	613 S	Use of restrict keyword.
R.9.1	Mandatory	The value of an object with automatic storage duration shall not be read before it has been set	53 D	Attempt to use uninitialised pointer.
			69 D	UR anomaly, variable used before assignment.
			631 S	Declaration not reachable.
			652 S	Object created by malloc used before initialisation.
R.9.2	Required	The initializer for an aggregate or union shall be enclosed in braces	105 S	Initialisation brace { } fault.
R.9.3	Required	Arrays shall not be partially initialized	397 S	Array initialisation has insufficient items.
R.9.4	Required	An element of an object shall not be initialised more than once	620 S	Initialisation designator duplicated.
			627 S	Initialiser both positional and designational.
R.9.5	Required	Where designated initialisers are used to initialize an array object the size of the array shall be specified explicitly	127 S	Array has no bounds specified.

R.10.1	Required	Operands shall not be of an inappropriate essential type	50 S	Use of shift operator on signed type.
			52 S	Unsigned expression negated.
			93 S	Value is not of appropriate type.
			96 S	Use of mixed mode arithmetic.
			109 S	Array subscript is not integral.
			114 S	Expression is not Boolean.
			120 S	Use of bit operator on signed type.
			123 S	Use of underlying enum representation value.
			136 S	Bit operator with boolean operand.
			249 S	Operation not appropriate to boolean type.
			329 S	Operation not appropriate to plain char.
			345 S	Bit operator with floating point operand.
			389 S	Bool value incremented/decremented.
			403 S	Negative (or potentially negative) shift.
			433 S	Type conversion without cast.
			506 S	Use of boolean with relational operator.
R.10.2	Required	Expressions of essentially character type shall not be used inappropriately in addition and subtraction	96 S	Use of mixed mode arithmetic.
			329 S	Operation not appropriate to plain char.
R.10.3	Required	The value of an expression shall not be assigned to an object with a narrower essential type or of a different essential type category	93 S	Value is not of appropriate type.
			96 S	Use of mixed mode arithmetic.
			101 S	Function return type inconsistent.
			104 S	Struct field initialisation incorrect.
			123 S	Use of underlying enum representation value.
			276 S	Case is not part of switch enumeration.
			330 S	Implicit conversion of underlying type (MR).
			331 S	Literal value requires a U suffix.
			411 S	Inappropriate value assigned to enum.
			431 S	Char used instead of (un)signed char.
			432 S	Inappropriate type - should be plain char.
			433 S	Type conversion without cast.
			434 S	Signed/unsigned conversion without cast.
			435 S	Float/integer conversion without cast.
			445 S	Narrower float conversion without cast.
			446 S	Narrower int conversion without cast.
			458 S	Implicit conversion: actual to formal param (MR).
			488 S	Value outside range of underlying type.

R.10.4	Required	Both operands of an operator in which the usual arithmetic conversions are performed shall have the same essential type category	93 S	Value is not of appropriate type.
			96 S	Use of mixed mode arithmetic.
			107 S	Type mismatch in ternary expression.
			123 S	Use of underlying enum representation value.
			330 S	Implicit conversion of underlying type (MR).
			331 S	Literal value requires a U suffix.
			433 S	Type conversion without cast.
			434 S	Signed/unsigned conversion without cast.
			435 S	Float/integer conversion without cast.
			488 S	Value outside range of underlying type.
R.10.5	Advisory	The value of an expression should not be cast to an inappropriate essential type	93 S	Value is not of appropriate type.
R.10.6	Required	The value of a composite expression shall not be assigned to an object with wider essential type	451 S	No cast for widening complex float expression (MR).
			452 S	No cast for widening complex int expression (MR).
R.10.7	Required	If a composite expression is used as one operand of an operator in which the usual arithmetic conversions are performed then the other operand shall not have wider essential type	451 S	No cast for widening complex float expression (MR).
			452 S	No cast for widening complex int expression (MR).
R.10.8	Required	The value of a composite expression shall not be cast to a different essential type category or a wider essential type	332 S	Widening cast on complex integer expression (MR).
			333 S	Widening cast on complex float expression (MR).
			441 S	Float cast to non-float.
			442 S	Signed integral type cast to unsigned.
			443 S	Unsigned integral type cast to signed.
			444 S	Integral type cast to non-integral.
R.11.1	Required	Conversions shall not be performed between a pointer to a function and any other type	93 S	Value is not of appropriate type.
			94 S	Casting operation on a pointer.
			95 S	Casting operation to a pointer.
			440 S	Cast from integral type to pointer.
			606 S	Cast involving function pointer.
R.11.2	Required	Conversions shall not be performed between a pointer to incomplete and any other type	94 S	Casting operation on a pointer.
			95 S	Casting operation to a pointer.
			439 S	Cast from pointer to integral type.
			440 S	Cast from integral type to pointer.
			554 S	Cast to an unrelated type.
R.11.3	Required	A cast shall not be performed between a pointer to object type and a pointer to a different object type	94 S	Casting operation on a pointer.
			95 S	Casting operation to a pointer.
			554 S	Cast to an unrelated type.

R.11.4	Advisory	A conversion should not be performed between a pointer to object and an integer type	439 S	Cast from pointer to integral type.
			440 S	Cast from integral type to pointer.
R.11.5	Advisory	A conversion should not be performed from pointer to void into pointer to object	95 S	Casting operation to a pointer.
			433 S	Type conversion without cast.
R.11.6	Required	A cast shall not be performed between pointer to void and an arithmetic type	439 S	Cast from pointer to integral type.
			440 S	Cast from integral type to pointer.
			635 S	Cast from pointer to float type.
			636 S	Cast from float type to pointer.
R.11.7	Required	A cast shall not be performed between pointer to object and a non-integer arithmetic type	94 S	Casting operation on a pointer.
			95 S	Casting operation to a pointer.
			439 S	Cast from pointer to integral type.
			440 S	Cast from integral type to pointer.
			635 S	Cast from pointer to float type.
			636 S	Cast from float type to pointer.
R.11.8	Required	A cast shall not remove any const or volatile qualification from the type pointed to by a pointer	203 S	Cast on a constant value.
			344 S	Cast on volatile value.
R.11.9	Required	The macro NULL shall be the only permitted form of integer null pointer constant	531 S	Literal zero used in pointer context.
R.12.1	Advisory	The precedence of operators within expressions should be made explicit	49 S	Logical conjunctions need brackets.
			361 S	Expression needs brackets.
R.12.2	Required	The right hand operand of a shift operator shall lie in the range zero to one less than the width in bits of the	51 S	Shifting value too far.
			403 S	Negative (or potentially negative) shift.
R.12.3	Advisory	The comma operator should not be used	53 S	Use of comma operator.
R.12.4	Advisory	Evaluation of constant expressions should not lead to unsigned integer wrap-around	493 S	Numeric overflow.
			494 S	Numeric underflow.
R.12.5	Mandatory	The sizeof operator shall not have an operand which is a function parameter declared as "array of type"	401 S	Use of sizeof on an array parameter.
R.13.1	Required	Initialiser lists shall not contain persistent side effects	35 D	Expression has side effects.
			1 Q	Call has execution order dependant side effects.
			9 S	Assignment operation in expression.
			30 S	Deprecated usage of ++ or -- operators found.
			132 S	Assignment operator in boolean expression.
			134 S	Volatile variable in complex expression.

R.13.2	Required	The value of an expression and its persistent side effects shall be the same under all permitted evaluation orders	35 D	Expression has side effects.
			72 D	Potential side effect problem in expression.
			1 Q	Call has execution order dependant side effects.
			9 S	Assignment operation in expression.
			30 S	Deprecated usage of ++ or -- operators found.
			134 S	Volatile variable in complex expression.
R.13.3	Advisory	A full expression containing an increment (++) or decrement (--) operator should have no other potential side effects other than that caused by the increment or decrement operator	30 S	Deprecated usage of ++ or -- operators found.
R.13.4	Advisory	The result of an assignment operator should not be used	9 S	Assignment operation in expression.
			132 S	Assignment operator in boolean expression.
R.13.5	Required	The right hand operand of a logical && or || operator shall not contain persistent side effects	35 D	Expression has side effects.
			1 Q	Call has execution order dependant side effects.
			406 S	Use of ++ or -- on RHS of && or || operator.
			408 S	Volatile variable accessed on RHS of && or ||.
R.13.6	Mandatory	The operand of the sizeof operator shall not contain any expression which has potential side effects	54 S	Sizeof operator with side effects.
			653 S	Apparent side effects in _Generic or _Alignof.
R.14.1	Required	A loop counter shall not have essentially floating type	39 S	Unsuitable type for loop variable.
R.14.2	Required	A for loop shall be well-formed	55 D	Modification of loop counter in loop body.
			270 S	For loop initialisation is not simple.
			271 S	For loop incrementation is not simple.
			429 S	Empty middle expression in for loop.
			430 S	Inconsistent usage of loop control variable.
			581 S	Loop conditions are independent.
R.14.3	Required	Controlling expressions shall not be invariant	139 S	Construct leads to infeasible code.
			140 S	Infeasible loop condition found.
R.14.4	Required	The controlling expression of an if statement and the controlling expression of an iteration-statement shall have essentially Boolean type	114 S	Expression is not Boolean.
R.15.1	Advisory	The goto statement should not be used	13 S	goto detected.
R.15.2	Required	The goto statement shall jump to a label declared later in the same function	509 S	goto label is backwards.

R.15.3	Required	Any label referenced by a goto statement shall be declared in the same block, or in any block enclosing the goto statement	511 S	Jump into nested block.
R.15.4	Advisory	There should be no more than one break or goto statement used to terminate any iteration statement	409 S	More than one break or goto statement in loop.
R.15.5	Advisory	A function should have a single point of exit at the end	7 C	Procedure has more than one exit point.
R.15.6	Required	The body of an iteration-statement or a selection-statement shall be a compound statement	11 S	No brackets to loop body (added by Testbed).
			12 S	No brackets to then/else (added by Testbed).
			428 S	No {} for switch (added by Testbed).
R.15.7	Required	All if . . else if constructs shall be terminated with an else statement	59 S	Else alternative missing in if.
			477 S	Empty else clause following else if.
R.16.1	Required	All switch statements shall be well-formed	385 S	MISRA switch statement syntax violation.
R.16.2	Required	A switch label shall only be used when the most closely-enclosing compound statement is the body of a switch statement	245 S	Case statement in nested block.
R.16.3	Required	An unconditional break statement shall terminate every switch-clause	62 S	Switch case not terminated with break.
R.16.4	Required	Every switch statement shall have a default label	48 S	No default case in switch statement.
			410 S	Switch empty default has no comment (MR).
R.16.5	Required	A default label shall appear as either the first or the last switch label of a switch statement	322 S	Default is not last case of switch.
R.16.6	Required	Every switch statement shall have at least two switch-clauses	60 S	Empty switch statement.
			61 S	Switch contains default only.
R.16.7	Required	A switch-expression shall not have essentially Boolean type	121 S	Use of boolean expression in switch.
R.17.1	Required	The features of <stdarg.h> shall not be used	44 S	Use of banned function, type or variable.
R.17.2	Required	Functions shall not call themselves, either directly or indirectly	6 D	Recursion in procedure calls found.
			1 U	Inter-file recursion found.
R.17.3	Mandatory	A function shall not be declared implicitly	496 S	Function call with no prior declaration.
R.17.4	Mandatory	All exit paths from a function with non-void return type shall have an explicit return statement with an expression	2 D	Function does not return a value on all paths.
			36 S	Function has no return statement.
			66 S	Function with empty return expression.
R.17.5	Advisory	The function argument corresponding to a parameter declared to have an array type shall have an appropriate number of elements	64 X	Array bound exceeded at call.
R.17.6	Mandatory	The declaration of an array parameter shall not contain the static keyword between the [ ]	614 S	Use of static keyword in array parameter.
R.17.7	Required	The value returned by a function having non-void return type shall be used	382 S	(void) missing for discarded return value.

R.17.8	Advisory	A function parameter should not be modified	14 D	Attempt to change parameter passed by value.
			149 S	Reference parameter to procedure is reassigned.
R.18.1	Required	A pointer resulting from arithmetic on a pointer operand shall address an element of the same array as that pointer operand	47 S	Array bound exceeded.
			436 S	Declaration does not specify an array.
			567 S	Pointer arithmetic is not on array.
			692 S	Array index is negative.
			64 X	Array bound exceeded at call.
			68 X	Parameter indexing array too big at call.
			69 X	Global array bound exceeded at use.
			72 X	Parameter indexing array too small at call.
R.18.2	Required	Subtraction between pointers shall only be applied to pointers that address elements of the same array	438 S	Pointer subtraction not addressing one array.
R.18.3	Required	The relational operators >, >=, < and <= shall not be applied to objects of pointer type except where they point into the same object	437 S	< > <= >= used on different object pointers.
R.18.4	Advisory	The +, -, += and -= operators should not be applied to an expression of pointer type	87 S	Use of pointer arithmetic.
			567 S	Pointer arithmetic is not on array.
R.18.5	Advisory	Declarations should contain no more than two levels of pointer nesting	80 S	Pointer indirection exceeds 2 levels.
R.18.6	Required	The address of an object with automatic storage shall not be copied to another object that persists after the first object has ceased to exist	42 D	Local pointer returned in function result.
			77 D	Local structure returned in function result.
			71 S	Pointer assignment to wider scope.
			565 S	Assignment to wider scope.
R.18.7	Required	Flexible array members shall not be declared	481 S	Array with no bounds in struct.
R.18.8	Required	Variable-length array types shall not be used	621 S	Variable-length array declared.
R.19.1	Mandatory	An object shall not be assigned or copied to an overlapping object	480 S	String function params access same variable.
			545 S	Assignment of overlapping storage.
			647 S	Overlapping data items in memcpy.
R.19.2	Advisory	The union keyword should not be used	74 S	Union declared.
R.20.1	Advisory	#include directives should only be preceded by preprocessor directives or comments	75 S	Executable code before an included file.
			338 S	#include preceded by non preproc directives.
R.20.2	Required	The ', " or \ characters and the /* or // character sequences shall not occur in a header file name	100 S	#include filename is non conformant.

R.20.3	Required	The #include directive shall be followed by either a <filename> or "filename" sequence	427 S	Filename in #include not in < > or " ".
R.20.4	Required	A macro shall not be defined with the same name as a keyword	86 S	Attempt to define reserved word.
			580 S	Macro redefinition without using #undef.
			626 S	#define of keyword.
R.20.5	Advisory	#undef should not be used	68 S	#undef used.
			426 S	#undef used in a block.
R.20.6	Required	Tokens that look like a preprocessing directive shall not occur within a macro argument	341 S	Preprocessor construct as macro parameter.
R.20.7	Required	Expressions resulting from the expansion of macro parameters shall be enclosed in parentheses	78 S	Macro parameter not in brackets.
			361 S	Expression needs brackets.
R.20.8	Required	The controlling expression of a #if or #elif preprocessing directive shall evaluate to 0 or 1	616 S	Preprocessor result not 0 or 1.
R.20.9	Required	All identifiers used in the controlling expression of #if or #elif preprocessing directives shall be #define'd before evaluation	337 S	Undefined macro variable in #if.
R.20.10	Advisory	The # and ## preprocessor operators should not be used	125 S	Use of ## or # in a macro.
R.20.11	Required	A macro parameter immediately following a # operator shall not immediately be followed by a ## operator	637 S	# operand followed by ##.
R.20.12	Required	A macro parameter used as an operand to the # or ## operators, which is itself subject to further macro replacement, shall only be used as an operand to these operators	125 S	Use of ## or # in a macro.
R.20.13	Required	A line whose first token is # shall be a valid preprocessing directive	147 S	Spurious characters after preprocessor directive.
			342 S	Extra chars after preprocessor directive.
R.20.14	Required	All #else, #elif and #endif preprocessor directives shall reside in the same file as the #if, #ifdef or #ifndef	126 S	A #if has no #endif in the same file.
			343 S	#else has no #if, etc in the same file.
R.21.1	Required	#define and #undef shall not be used on a reserved identifier or reserved macro name	86 S	Attempt to define reserved word.
			156 S	Use of 'defined' keyword in macro body.
			219 S	User name starts with underscore.
R.21.2	Required	A reserved identifier or reserved macro name shall not be declared	218 S	Name is used in standard libraries.
			219 S	User name starts with underscore.
R.21.3	Required	The memory allocation and deallocation functions of <stdlib.h> shall not be used	44 S	Use of banned function, type or variable.

R.21.4	Required	The standard header file <setjmp.h> shall not be used	43 S	Use of setjmp/longjmp.
R.21.5	Required	The standard header file <signal.h> shall not be used	130 S	Included file is not permitted.
R.21.6	Required	The Standard Library input/output routines shall not be used.	44 S	Use of banned function, type or variable.
			130 S	Included file is not permitted.
R.21.7	Required	The Standard Library functions atof, atoi, atol and atoll of <stdlib.h> shall not be used	44 S	Use of banned function, type or variable.
R.21.8	Required	The Standard Library termination functions of <stdlib.h> shall not be used	122 S	Use of abort, exit, etc.
R.21.9	Required	The Standard Library functions bsearch and qsort of <stdlib.h> shall not be used	44 S	Use of banned function, type or variable.
R.21.10	Required	The Standard Library time and date routines shall not be used	44 S	Use of banned function, type or variable.
			130 S	Included file is not permitted.
R.21.11	Required	The standard header file <tgmath.h> shall not be used	130 S	Included file is not permitted.
R.21.12	Advisory	The exception handling features of <fenv.h> should not be used	44 S	Use of banned function, type or variable.
R.21.13	Mandatory	Any value passed to a function in <ctype.h> shall be representable as an unsigned char or be the value EOF	663 S	Invalid value may be passed to function in <ctype.h>.
R.21.14	Required	The Standard Library function memcmp shall not be used to compare null terminated strings	661 S	memcmp used to compare null terminated strings.
R.21.15	Required	The pointer arguments to the Standard Library functions memcpy, memmove and memcmp shall be pointers to qualified or unqualified versions of compatible types	655 S	Standard library copy/compare objects have different types.
R.21.16	Required	The pointer arguments to the Standard Library function memcmp shall point to either a pointer type, an essentially signed type, an essentially unsigned type, an essentially Boolean type or an essentially enum type	618 S	Use of memcmp between structures.
R.21.17	Mandatory	Use of the string handling functions from <string.h> shall not result in accesses beyond the bounds of the objects referenced by their pointer parameters	489 S	Insufficient space for operation.
			600 S	Argument of strlen is unterminated.
			140 D	Copy source parameter not checked before use.
			66 X	Insufficient array space at call.
			70 X	Array has insufficient space.
			71 X	Insufficient space for copy.

R.21.18	Mandatory	The size_t argument passed to any function in <string.h> shall have an appropriate value	489 S	Insufficient space for operation.
			66 X	Insufficient array space at call.
			70 X	Array has insufficient space.
			71 X	Insufficient space for copy.
			79 X	Size mismatch in memcpy/memset.
R.21.19	Mandatory	The pointers returned by the Standard Library functions localeconv, getenv, setlocale or, strerror shall only be used as if they have pointer to const-qualified type	107 D	Attempt to change system call capture string.
R.21.20	Mandatory	The value returned by a call of one of the Standard Library functions asctime, ctime, gmtime, localtime, localeconv, getenv, setlocale or strerror shall not be used following a subsequent call to the same function	133 D	Pointer from system function used after subsequent call.
R.21.21	Required	The Standard Library function system of <stdlib.h> shall not be used	588 S	Use of system function.
R.22.1	Required	All resources obtained dynamically by means of Standard Library functions shall be explicitly released	49 D	File pointer not closed on exit.
			50 D	Memory not freed after last reference.
			75 D	Attempt to open file pointer more than once.
R.22.2	Mandatory	A block of memory shall only be freed if it was allocated by means of a Standard Library function	51 D	Attempt to read from freed memory.
			125 D	free called on variable with no allocated space.
			407 S	free used on string.
			483 S	Freed parameter is not heap item.
			484 S	Attempt to use already freed object.
			644 S	realloc ptr does not originate from allocation function.
R.22.3	Required	The same file shall not be open for read and write access at the same time on different streams	103 D	File opened both read and write.
R.22.4	Mandatory	There shall be no attempt to write to a stream which has been opened as read-only	98 D	Attempt to write to file opened read only.
R.22.5	Mandatory	A pointer to a FILE object shall not be dereferenced	591 S	Inappropriate use of file pointer.
R.22.6	Mandatory	The value of a pointer to a FILE shall not be used after the associated stream has been closed	48 D	Attempt to write to unopened file.
			113 D	File closed more than once.

R.22.7	Required	The macro EOF shall only be compared with the unmodified return value from any Standard Library function capable of returning EOF	662 S	EOF compared with char.
R.22.8	Required	The value of errno shall be set to zero prior to a call to an errno-setting-function	111 D	errno checked without having been set for errno setting fn.
			121 D	errno neither set nor checked for errno setting function.
R.22.9	Required	The value of errno shall be tested against zero after calling an errno-setting-function	121 D	errno neither set nor checked for errno setting function.
			122 D	errno not checked after being set for errno setting fn.
			134 D	errno not checked before subsequent function call.
R.22.10	Required	The value of errno shall only be tested when the last function to be called was an errno-setting-function	132 D	errno checked after call to non-errno setting function.

General Compliance Notes

Enhanced Enforcement: LDRA checks additional cases to those specified by the mapped rule for enhanced safety and security.
Fully Implemented: LDRA checks all statically checkable aspects of the mapped rule.
Partially Implemented: LDRA checks certain aspects of the rule.

The assessment of whether a rule is fully or partially implemented is based on whether the mapped LDRA standards cover all statically checkable aspects of the rule with a high level of coverage or only cover certain statically checkable aspects of the rule. If a rule is undecidable then this assessment is based on what it is deemed reasonable for a static analysis tool to check.