Coverage for ISO/IEC 8652:2012 and subsequent corrections in ACATS 3.x and 4.x Clauses 6.5-6.8

A Key to Kinds and subkinds is found on the sheet named Key. Tests new to ACATS 3.0 are shown in **bold**; ACATS 3.1 in **bold italic**; ACATS 4.0 in **blue bold**; ACATS 4.1 in **blue bold italic**. ACATS 4.2 in **green bold italic**.

								Submitted tests		
Clause	Para.	Lines	Kind	Subkind	Notes	Tests	New Priority	Objective Text	Objective notes	(will need work).
6.5	(1/2)		Definitions		Return statement					
	(2/2)		Syntax							
	(0.4(0)		0 1		Al05-0277-1 gives the declaration it's					
	(2.1/3)		Syntax		own production.					
	(2.2/3)		Syntax		Al05-0015-1 adds "constant" (Ada2012).					
	(2.2/0)		Cymax		Paragraph number changed by Al05-					
	(2.3/2)		Syntax		0277-1.					
	(3/5)	1	Definitions		Result subtype					
				Widely	Basic resolution is tested in any test					
		2	NameRes	used	using a simple return statement.					
								Check that a call to an overloaded function as the expression		
								of a simple return statement can be resolved if only one of the functions matches the type of the function containing the		
			NameRes			C87B44A		return statement.		
									B-Test; low priority as this is just normal	
									resolution. We need to try anonymous	
						B58003A (normal, Integer)).	Check that the type of the expression of a simple return	access result cases, as well as tagged and untagged private types (where we to	v
				Negative		B58003B (generic, Integer		2 statement must match the result type of the function.	to return something of the full type).	,
					Basic resolution is tested in any test					
					using an extended return statement					
				Widely	with an initializing expression. Text (bu not meaning) changed by Al12-0173-	l				
		3	NameRes	used	1).					
								Check that a call to an overloaded function as the expression		
								of an extended return statement can be resolved if only one of the functions matches the type of the function containing the		
			NameRes					7 return statement.	C-Test. Look at C87B44A for inspiration	
									B-Test; low priority as this is just normal	
									resolution. We need to try anonymous	
								Charly that the type of the initializing everyonian of an	access result cases, as well as tagged	n.,
								Check that the type of the initializing expression of an extended return statement must match the return subtype of	and untagged private types (where we to initialize with something of the full	у
								2 the return statement.	type).	
						C58004C, and many				
	(4/0)	4	Landit	Widely		others. C650003 (extended return)	A II	Check that a return statement is allowed in a		
	(4/2)	1	Legality	used		(extended return) C650002	All	subprogram_body.		
						C030002	All	Check that a return statement is allowed in an entry_body. Check that a return statement is allowed in an		
						C650002	All	accept_statement.		
								Check that a simple return statement is illegal if it is not within		
				Negative		B650004	All	a callable construct.		
								Check that an extended return statement is illegal if it is not		
						B650004	All	within a callable construct.		

	2	Legality		"Construct to which it applies" can be a procedure, function, entry body, accept statement, or extended return statement.	B650004	All	Check that a simple return statement is illegal if it is within a body that is within the construct to which it applies.
					B650004	All	Check that an extended return statement is illegal if it is within a body that is within the construct to which it applies.
(5/5)	1	Legality	Widely used	Any legal function.			
			Negative Widely		B65002A, B65002B		Check that a function is illegal if it does not contain a return statement.
	2	Legality	used	Any legal simple return statement.			
			Negative	B58002A, B58002B, B58002C were replaced; there was no entry body test.	B650002	All	Check that a simple return statement cannot have an expression if used in a procedure body, entry body, or accept statement.
			Negative	B58002A and B58002B were replaced.	B650002	All	Check that a simple return statement cannot omit the expression if used in a function body.
			Negative		B650002	All	Check that a simple return statement inside of an extended return statement cannot have an expression.
	3	Legality	Subpart	Any extended return test.			Charly that an automoded vature at atomout account to
			Negative		B650002	All	Check that an extended return statement cannot be used to return from a procedure body, entry body, or accept statement.
					B650002	All	Check that an extended return statement cannot be used to return from an outer extended return statement.
	4	Legality	Subpart	Any extended return test using constant . Rule added by Al05-0015, then text modified by Al12-0173-1.	B030002	All	return nom an outer extended return statement.
			Negative		B650006	All	Check that an extended return statement containing constant cannot omit an expression.
(5.1/5) (5.2/5) (5.3/5)	1	Definition Legality Legality	Subpart Portion Subpart	Definition of expression of an extended return, added by Al12-0173-1. Widely used in other rules, no semantic change intended. Does change paragraph numbers of below paragraphs. Lead-in for the bullets below. Most extended return tests.			
							Check that the return_subtype_indication of an extended return statement cannot be an access_definition if the result
	2	Legality	Negative Subpart	Most extended return tests.	B650001	All	subtype of the function it appears in is given by a subtype_mark.
				"Covered by" is added by Al05-0032-1.	C650B03 (nonlimited), C650A02 (two limited cases in auxillary function)	All	Check that if the result subtype of a function is class-wide, the return_subtype_indication of an extended_return_statement given within it can be any definite specific subtype that is covered by the class-wide result type.
			Negative		B650001	All	Check that the return_subtype_indication of an extended return statement cannot fail to be covered by the result subtype of the function it appears in if that subtype is given by a subtype_mark.

	3	Legality	Subpart	Many extended return tests. Substantially changed by Al05-0103-1.				
			Negative		B650001	All	Check that if the result subtype of a function is constrained, an extended return statement given within it cannot have an unconstrained return_subtype_indication.	This objective is OK, even given the new wording (it is just more limited than necessary).
					B650001	All	Check that if the result subtype of a function is elementary, an extended return statement given within it is illegal if the return_subtype_indication does not statically match the result subtype.	
					B650001	All	Check that an extended return statement is illegal if the return_subtype_indication is not statically compatible with the result subtype.	
	4	Legality					Check that if the result subtype of a function is indefinite, the return_subtype_indication of an extended_return_statement 8 given within it can be any definite subtype of the result type.	C-Test. Class-wide cases have their own objective above; this objective covers discriminated records and unconstrained arrays. Combine with the following??
					C650A02 (limited, class-wide)		Check that if the result subtype of a function is indefinite, the return_subtype_indication of an extended_return_statement 7 given within it can be indefinite if an expression is given.	C-Tests. (Vaguely covered in B650001.) Still need a test for discriminated records and for unconstrained arrays.
			Negativo		B650001	ΔIJ	Check that if the result subtype of a function is indefinite, the return_subtype_indication of an extended_return_statement given within it cannot be indefinite unless an expression is	
(= . (=)			Negative	Any C-Test with an anon. access return		All	given.	
(5.4/5)	1	Legality	Subpart	subtype			Check that the return_subtype_indication of an extended return statement cannot be a subtype_indication if the result subtype of the function it appears in is given by an	
			Negative	Any C-Test with an anon. access return	B650001	All	access_definition.	
	2	Legality	Subpart	subtype				
			Negative		B650001	All	Check that the subtype defined by the access_definition in the return_subtype_indication of an extended_return_statement is illegal if it does not statically match the return subtype of the function that it applies to.	
	3	Definition	rvegative	Accessibility level of extended return statement.	200001	7.11	idification that it applies to.	
							If the result subtype of a function is class-wide, check that the accessibility level of the type of the return_subtype_indication	
(5.5/5)		Legality		This paragraph was added by Al05-0032-1.	B650005	All	of an extended return statement cannot be statically deeper than the master that elaborated the function.	
(5.6/5)		Legality	Portion	Lead-in for the bullets below. [Careful, this paragraph was renumbered by Al05-0032-1]				
(5.7/5)		Redundant		This rule is redundant with 7.5(2.8/2); we'll test it there. [Careful, this paragraph was renumbered by Al05-0032-1]				
(5.8/5)		Legality		6.5(8/2) contains a run-time version of this rule. This paragraph was renumbered by Al05-0032-1.	B650003	All	If the result subtype of a function is class-wide, check that the accessibility level of the type of the return expression cannot be statically deeper than the master that elaborated the function.	

(5.9/5)	Legality		6.5(21/3) contains a run-time version of this rule. This paragraph was split from the preceding paragraph by Al05-0051-1.			If the result subtype of a function has unconstrained access discriminants, the accessibility level of the type of each discriminant cannot be statically deeper than the master that 7 elaborated the function.	B-Test. Good luck figuring out how to test this. ;-) Note: The rule applies to constrained access discriminants as well, but that cannot fail.
(5.10/5)	Legality		Added by Al05-0277-1.			If the result subtype of a function is immutably limited, check that the keyword aliased can be used in an 5 extended_return_object_declaration.	C-Test. We include a C-Test here because this is likely to be rare and thus not tested much elsewhere (the only other known test would be in 3.10).
		Negative		B650007	All	If the keyword aliased is present in an extended_return_object_declaration, check that the type of the result object cannot be any type that is not immutably limited.	
(5.11/5) 1	StaticSem	Subpart	Defines the nominal subtype, affects other rules. [Careful, this paragraph was renumbered by three Als]				
2		Subpart	Added by Al05-0015. Defines the return object as a constant.	ı			
(5.12/5) 1	Dynamic		Modified by Al05-0032-1; renumbered by 3 Als.			Check that the subtype of an extended return statement is 6 elaborated.	C-Test. Check that exceptions are raised if needed, and any functions are called.
		Not Testable	Can't check that an anonymous access type is elaborated: it has no effect.				
2		Not Testable	No observable effect.				
3						Check that the expression of an extended return is evaluated 6 and converted to the nominal subtype.	C-Test. Check that exceptions are raised for necessary, and any functions are called, and Adjust is called if needed. Priority is higher than usual for this sort of chief the beguns the extension to prove
3						o and converted to the nominal subtype.	objective because the statement is new. C-Test. Check that value is correct, and that any functions are called. If Initialize is
4						Check that an extended return statement without an 6 expression causes the return object to be initialized by default.	is called when needed is an objective for 7.6(10/2).
5						Check that an extended return statement with an object of an 6 indefinite subtype is constrained by its initial value.	C-Test. Try to change the bounds/discriminants.
6, 7			Added by AI05-0032-1.			Check that Constraint_Error is raised if the return object is not 6 in the return subtype.	C-Test. This is thought to be only possible for class-wide return subtypes that have a constraint.
(6/2)	Dynamic			C58005A (integer), C58005B (integer), C58005H (access), C58006A, C58006B (integer eval.)		Check that the expression of an simple return is evaluated and 4 converted to the result subtype of the function.	C-Test. Check constraints of array and record types. Check class-wide expressions for functions returning specific tagged types.
(7/2)	Redundant		Tested in 9.2.	,		Check that result of a function that returns a specific tagged	. 33 %
(8/4) 1	Dynamic			C650B01	All	type has the tag of the tagged result type, even if the return expression has a different tag.	
				C390004 (simple returns of a local object), <i>C650A02</i> (returns of limited expressions), <i>C650B02</i>	f	Check that the tag of the result of a function that returns a	
2	Dynamic		Changed by Al05-0032-1 and Al12- 0097-1.	(returns of non-limited expressions)	All	class-wide tagged type with a simple return statement is that of the expression.	

C-Test. Make sure to only test cases that aren't illegal by 6.5(5.6/2). Don't forget to test extended returns. Still need to do incomparable cases like those found in Al05-024 (but hold for resolution of Al12-0016-1). Try to use foundation F650B00 for the basic types.
C-Test. Try this with other kinds of types (arrays, anonymous access, etc.).
This test just tries a limited record type. Other kinds of types will be tried with C-Tests for other objectives.
C-Test. Use C650A01 as the outline for the test. This case is motivated by Al12-0343-1, but the requirement is unchanged.
-
attiii AC f

(14/2) (15/2) (16/2) (17/2) (18/2) (19/2) (20/2)	Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted		
(21/3)	Dynamic		Rule was substantially modified by AI05-0051-1.
(22/5)	Dynamic		Check was added by Al12-0343-1.
(23/2)	Dynamic	Subpart	Constantness is defined in 3.3(15-22), and the results of that rule are tested elsewhere.
(24/3) (24.1/3) (24.2/3)	Impl-Def Impl-Def Impl-Def	Subpart	Not separately testable, but it needs to be taken into account when creating other tests. Modified by Al05-0050, now a lead-in. A permission, added by Al05-0050. A permission, added by Al05-0050.
		Negative	
(25) (26/2) (27) (28/2)	NonNormative NonNormative NonNormative	Negative	Start of exampleend of example.

If the result subtype of a function has access discriminants, check that Program_Error is raised if the accessibility level of the type of any corresponding access discriminant is deeper 8 than the master of the call.

If any subcomponent of the specific result subtype of a function has access discriminants, check that Program_Error is raised if the accessibility level of the type of any corresponding access discriminant is deeper than the master 6 of the call.

Check that a predicate check is made on the result of a function, even if that result is modified by the 5 sequence of statements of an extended return statement.

C-Test. Make sure to only test cases that aren't illegal by 6.5(5.9/5). Be careful that your head does not explode. Include cases where the result is modifed in the sequence_of_statements of an extended return statement.

C-Test. Be sure to test cases where the presence of access discriminants is only known at run-time, and cases where they don't actually exist. (See the AARM notes.)

C-Test. As a BI, it can be tested even though it is an Ada 202x AI. Test cases like the one in the AARM note where a component of the result is modified in the sequence of statements. (Such that the predicate is not checked in the statements.)

Check that if the result subtype of a function is unconstrained and the return object is not known to be constrained,
Constraint_Error is not raised before the entire function
8 executes

Check that if the result subtype of a function is an unconstrained elementary type, and the return object in an extended return statement is initialized to be out-of-range for the result object, Constraint_Error is not raised until the entire 7 extended return statement has executed

C-Test. We're checking that the permission is not applied inappropriately. The return object should have discriminants with defaults (the wrong defaults), be default-initialized, and the discriminants should be changed to the correct ones before returning (so that no exception should be raised).

C-Test. We're checking that the permission is not applied to elementary type functions. Use Integer'Base to get an unconstrained discrete type. Also try float and access types (not null).

6.6	(1)	1	Definitions		"operator".				
6.6	(4)		Definitions		lle se exerte all				
	(10/3)		NonNormative		An example.	C651002 (aspect)	All	exception to "return" to the caller.	
	(9/2)		Dynamic			C651001 (pragma), C651002 (aspect) C651001 (pragma),	All	Check that a nonreturning procedure raises Program_Error if i attempts to return normally. Check that a nonreturning procedure can propagate an	t
	(8/3)		Deleted		Deleted by Al05-0229-1.			.	
	(7/3)		Legality		Modified by Al12-0269-1	B651001 (pragma), B651002 (aspect)	All	Check that a renames-as-body that completes a nonreturning procedure declaration renames a nonreturning procedure.	
	, ,		,			, I /		6 Check that a nonreturning procedure can be dispatching.	C-Test. This is a corollary of this rule.
	(6/3)		Legality			B651004 (aspect)	Parti al	Check that a procedure that overrides a dispatching 2 nonreturning procedure must be nonreturning.	B-Test needed for the pragma (but it's obsolescent).
	(5/2)		Legality			B651001 (pragma), B651002 (aspect)	All	Check that a return statement cannot be used in a nonreturning procedure.	B-Test. Check simple returns, both at the outer level and nested inside of statements and blocks. Check both generic and non-generic subprograms.
						B651003	All	Check that the aspect No_Return cannot be specified for a generic instance of a procedure.	
	(4/3)		Legality			B651003	All	Check that the aspect No_Return cannot be specified for a null procedure.	
	(3.4/3)		Definitions		This rule should be tested as part of other tests, specifically that of paragraph 9.				
		2	Definitions	Widely Used	Defines that the aspect is not set by default. Any test that doesn't use Non_Returning implicitly is testing this.				
				Negative		B651003	All	Check that the expression specified for aspect No_Return cannot be nonstatic.	
	(3.3/3)	1	Legality	Subpart	Legal tests will check this.				
		2	Definitions		Defines "nonreturning". Other tests will test this definition.				
	(3.2/3)	1	NameRes					Check that the expected type of the expression specified for 2 aspect No_Return is Boolean.	B-Test; low priority as this is just normal resolution and as the expression has to be static, its hard to test any meaningful overloading cases.
				Negative		B651003	All	Check that the aspect No_Return cannot be specified for a non-subprogram.	
				Negative		B651003	All	Check that the aspect No_Return cannot be specified for a entry.	
						B651003	All	Check that aspect No_Return cannot be specified for a function (including an expression function) or generic function.	
	(3/3) (3.1/3)		Deleted Definitions	Lead-in	Deleted by Al05-0229-1.				
	(2/3)		Deleted		Deleted by AI05-0229-1.				
6.5.1	(1/5)		General		Al05-0229-1 rewrites the entire section in terms of aspects; Al12-0269-1 extends the aspect to all subprograms.				
					Al05-0229-1 rewrites the entire section				

2

Redundant

	(2)		Definitions	Widely Used	Any use of user-defined operators tests this equivalence.				
	(3/3)	1	Legality		Modified by AI05-0143-1.	B67001A (normal declarations), B67001B (formal subprograms), B67001D (renaming)		Check that the subprogram declaration defining an operator cannot have more or less parameters than defined by the kind of operator (unary or binary).	
						B67001A, B67001B, B67001C, B67001D, B67001H, B67001I, B67001J, B67001K		Check that non operators (membership, short circuit, assignment) cannot be used in operator symbols.	
						C67002A (normal), C67002B (case differences), C67002C (formal subprograms), C67002E (renames)		Check that a subprogram declaration for an operator symbol can be given if the number of parameters is correct for the kind of operator (unary or binary).	
						B660003	All	Check that parameters of mode in out and out are not allowed in the declaration of operators.	
		2				B67001C		Check that an instance defining an operator cannot have more or less parameters than defined by the kind of operator (unary or binary).	
						C67002D		Check that a instance can be named by an operator symbol can be given if the number of parameters is correct for the kind of operator (unary or binary).	
						B660003	All	Check that a generic function with a parameter of mode in out or out cannot be instantiated as an operator.	
	(4)					B67001A (normal declarations), B67001B (formal subprograms), B67001C (instances),		Check that default expressions are not allowed in the	
	(4)		Legality			B67001D (renaming)		parameters of an operator. Check that an explicit declaration of "/=" does not have a	
	(5)		Legality			B660001, B660002		result of Boolean. Check that an explicit declaration of "=" whose result is	The test tries the tagged case; the untagged case occurs for various language-defined packages including Ada.Strings.Unbounded, so a bug would turn up in virtually any test or use of those packages – a separate test is
	(6/3)		StaticSem		Modified by Al05-0128-1.	C660001	All	Boolean declares a "/=" as well.	unnecessary.
						B660002		Check that a declaration of "=" whose result is not Boolean does not declare a "/=".	
						C660001	All	Check that a declaration of "/=" implicitly created by the declaration of "=" with a Boolean result is inherited for a derived type.	
	(7)		NonNormative		A note.				
	(8)		NonNormative		Start of example				
	(9)		NonNormative		end of example.				
6.7	(1/2)		General						
	(2/3)		Syntax		Al05-0183-1 adds aspect clauses; these will be tested as part of other rules.				
	(2.1/3)	1	Legality					Check that a null procedure can be the completion of a 4 procedure or generic procedure declaration.	C-Test.

				Negative				Check that a null procedure cannot complete a function 6 declaration or any kind of subprogram body.	B-Test.
	(3/2)	2	Legality Definitions		"null procedure"			Check that a null procedure that completes a procedure or generic procedure declaration must fully conform to the profile of that declaration.	B-Test. We don't need to check all of the conformance rules here, just a small selection to ensure that the check is made.
	(0/2)	2	Legality		nun procedure	B670001	All	Check that a completion is not allowed for a null procedure.	
	(4/2)		Dynamic	Not Testable	Can't check "no effect", as we'd have to guess what effect the implementation would mistakenly have.				
	(5/3)		Dynamic	Not Testable	Can't check "no effect", except to ensure that elaboration checks don't fail. Any call to a null procedure will test that.				
								Check that a call to a procedure that is completed by a not yet	C-Test. Low priority because it's hard to construct such a case, so it's pretty unlikely – and nothing bad will happen even if the check is omitted. Could base
				Negative				3 elaborated null procedure raises Program_Error. Check that a null procedure can be called when the body of	on the test from C680001.
	(6/2)		NonNormative		An example.			4 the package it is contained in has not yet been elaborated.	C-Test.
6.8	(1/3)		General		This entire subclause was added by Al05-0177-1.				
	(2/4)		Syntax		Aggregate was added by Al12-0157-1.				
	(3/4)		NameRes		Aggregate was added by AI12-0157-1.			Check that a call to an overloaded function as the expression of a expression function can be resolved if only one of the functions matches the result type of the expression function.	C-Test. Not very important as it's just normal resolution.
				Negative		B680001	All	Check that the type of the expression of an expression function must match the result type of the expression function.	We could test additional cases (the test only tries two simple cases) but this is unimportant as this is just normal resolution.
	(4/3)	1	Legality			C680001	All	Check that an expression function can be the completion of a function or generic function declaration.	
						B680001	All	Check that an expression function cannot complete a procedure declaration, a package declaration, or any kind of body.	Could have tried other kinds of program units (protected, tasks) and additional bodies, but those are just normal homograph rules.
		2	Legality			B680001	All	Check that an expression function that completes a function or generic function declaration must fully conform to the profile of that declaration.	
	(5/4)		Legality		Aggregate was added by AI12-0157-1.			If the result subtype of an expression function has unconstrained access discriminants, the accessibility level of the type of each discriminant cannot be statically deeper than 7 the master that elaborated the function.	B-Test. Good luck figuring out how to test this. ;-) [But it's the same as 6.5(5.8/3).] It's not clear that it is testable here, as no local objects are possible.
	(6/4)	1 2	Definition Definition		"expression function". "return expression"				
		3	Legality		. 5.12	B680001	All	Check that a completion is not allowed for an expression function.	There really is only one way to do this sensibly, other cases usually are normal homograph violations.

(7/4)	Dynamic			C680001, C760A03 (limited)	Part 4		C-Test. Try cases that fail the checks described in 6.5 for a simple return (in particular, the various tag checks).
				B732C01, C760A03	All	Check that an aggregate can directly be the return expression of an expression function.	
				C680001	All	·	This test ensures that the implementation can deal with expression functions that cannot be inlined.
(8/3)	Dynamic	Not Testable	Can't check "no effect", except to ensure that elaboration checks don't fail. Any call to an expression function will test that.				
		Negative		C680001	All	Check that a call to a function that is completed by a not yet elaborated expression function raises Program_Error.	
(9/3)	NonNormative		An example.				

Check that a call to an expression function executes as a body C-Test. Try cases that fail the checks

	Objectives with tests:	Objectives to test: Total objectives:
	76	32
Must be tested	Objectives with Priority 10	0
	Objectives with Priority 9	0
Important to test	Objectives with Priority 8	3
·	Objectives with Priority 7	6
Valuable to test	Objectives with Priority 6	9
	Objectives with Priority 5	4
Ought to be tested	Objectives with Priority 4	5
· ·	Objectives with Priority 3	1
Worth testing	Objectives with Priority 2	4
Not worth testing	Objectives with Priority 1	0
C	Total:	32
	Objectives covered by new	04
		61
	Completely:	57

Paragraphs: 86

Objectives with submitted tests:

101