

ISO/IEC 16262:2011-06 (E)

Information technology - Programming languages, their environments and system software interfaces - ECMAScript language specification

Contents		Page
Foreword		viii
Introduction		ix
1	Scope	1
2	Conformance	1
3	Normative references	1
4	Overview	1
4.1	Web Scripting	2
4.2	Language Overview	2
4.2.1	Objects	3
4.2.2	The Strict Variant of ECMAScript	4
4.3	Terms and definitions	4
5	Notational Conventions	8
5.1	Syntactic and Lexical Grammars	8
5.1.1	Context-Free Grammars	8
5.1.2	The Lexical and RegExp Grammars	8
5.1.3	The Numeric String Grammar	8
5.1.4	The Syntactic Grammar	8
5.1.5	The JSON Grammar	9
5.1.6	Grammar Notation	9
5.2	Algorithm Conventions	12
6	Source Text	13
7	Lexical Conventions	14
7.1	Unicode Format-Control Characters	14
7.2	White Space	15
7.3	Line Terminators	15
7.4	Comments	16
7.5	Tokens	17
7.6	Identifier Names and Identifiers	17
7.6.1	Reserved Words	18
7.7	Punctuators	19
7.8	Literals	20
7.8.1	Null Literals	20
7.8.2	Boolean Literals	20
7.8.3	Numeric Literals	20
7.8.4	String Literals	22
7.8.5	Regular Expression Literals	25
7.9	Automatic Semicolon Insertion	26
7.9.1	Rules of Automatic Semicolon Insertion	26
7.9.2	Examples of Automatic Semicolon Insertion	27
8	Types	28
8.1	The Undefined Type	28
8.2	The Null Type	28

8.3	The Boolean Type	29
8.4	The String Type	29
8.5	The Number Type	29
8.6	The Object Type	30
8.6.1	Property Attributes	30
8.6.2	Object Internal Properties and Methods	31
8.7	The Reference Specification Type	35
8.7.1	GetValue (V)	35
8.7.2	PutValue (V, W)	36
8.8	The List Specification Type	36
8.9	The Completion Specification Type	36
8.10	The Property Descriptor and Property Identifier Specification Types	37
8.10.1	IsAccessorDescriptor (Desc)	37
8.10.2	IsDataDescriptor (Desc)	37
8.10.3	IsGenericDescriptor (Desc)	37
8.10.4	FromPropertyDescriptor (Desc)	38
8.10.5	ToPropertyDescriptor (Obj)	38
8.11	The Lexical Environment and Environment Record Specification Types	39
8.12	Algorithms for Object Internal Methods	39
8.12.1	[[GetOwnProperty]] (P)	39
8.12.2	[[GetProperty]] (P)	39
8.12.3	[[Get]] (P)	39
8.12.4	[[CanPut]] (P)	39
8.12.5	[[Put]] (P, V, Throw)	40
8.12.6	[[HasProperty]] (P)	40
8.12.7	[[Delete]] (P, Throw)	41
8.12.8	[[DefaultValue]] (hint)	41
8.12.9	[[DefineOwnProperty]] (P, Desc, Throw)	41
9	Type Conversion and Testing	43
9.1	ToPrimitive	43
9.2	ToBoolean	43
9.3	ToNumber	43
9.3.1	ToNumber Applied to the String Type	44
9.4	ToInteger	46
9.5	ToInt32: (Signed 32 Bit Integer)	47
9.6	ToUint32: (Unsigned 32 Bit Integer)	47
9.7	ToUint16: (Unsigned 16 Bit Integer)	47
9.8	ToString	48
9.8.1	ToString Applied to the Number Type	48
9.9	ToObject	49
9.10	CheckObjectCoercible	49
9.11	IsCallable	49
9.12	The SameValue Algorithm	50
10	Executable Code and Execution Contexts	50
10.1	Types of Executable Code	50
10.1.1	Strict Mode Code	51
10.2	Lexical Environments	51
10.2.1	Environment Records	51
10.2.2	Lexical Environment Operations	56
10.2.3	The Global Environment	56
10.3	Execution Contexts	56
10.3.1	Identifier Resolution	57
10.4	Establishing an Execution Context	57
10.4.1	Entering Global Code	58
10.4.2	Entering Eval Code	58
10.4.3	Entering Function Code	58
10.5	Declaration Binding Instantiation	59
10.6	Arguments Object	60
11	Expressions	63

11.1	Primary Expressions	63
11.1.1	The this Keyword	63
11.1.2	Identifier Reference	63
11.1.3	Literal Reference	63
11.1.4	Array Initialiser	63
11.1.5	Object Initialiser	65
11.1.6	The Grouping Operator	67
11.2	Left-Hand-Side Expressions	67
11.2.1	Property Accessors	67
11.2.2	The new Operator	68
11.2.3	Function Calls	68
11.2.4	Argument Lists	69
11.2.5	Function Expressions	69
11.3	Postfix Expressions	69
11.3.1	Postfix Increment Operator	70
11.3.2	Postfix Decrement Operator	70
11.4	Unary Operators	70
11.4.1	The delete Operator	70
11.4.2	The void Operator	71
11.4.3	The typeof Operator	71
11.4.4	Prefix Increment Operator	71
11.4.5	Prefix Decrement Operator	72
11.4.6	Unary + Operator	72
11.4.7	Unary - Operator	72
11.4.8	Bitwise NOT Operator (~)	72
11.4.9	Logical NOT Operator (!)	73
11.5	Multiplicative Operators	73
11.5.1	Applying the * Operator	73
11.5.2	Applying the / Operator	74
11.5.3	Applying the % Operator	74
11.6	Additive Operators	75
11.6.1	The Addition operator (+)	75
11.6.2	The Subtraction Operator (-)	75
11.6.3	Applying the Additive Operators to Numbers	75
11.7	Bitwise Shift Operators	76
11.7.1	The Left Shift Operator (<<)	76
11.7.2	The Signed Right Shift Operator (>>)	76
11.7.3	The Unsigned Right Shift Operator (>>>)	77
11.8	Relational Operators	77
11.8.1	The Less-than Operator (<)	77
11.8.2	The Greater-than Operator (>)	78
11.8.3	The Less-than-or-equal Operator (<=)	78
11.8.4	The Greater-than-or-equal Operator (>=)	78
11.8.5	The Abstract Relational Comparison Algorithm	78
11.8.6	The instanceof operator	79
11.8.7	The in operator	79
11.9	Equality Operators	80
11.9.1	The Equals Operator (==)	80
11.9.2	The Does-not-equals Operator (!=)	80
11.9.3	The Abstract Equality Comparison Algorithm	80
11.9.4	The Strict Equals Operator (===)	81
11.9.5	The Strict Does-not-equal Operator (!==)	81
11.9.6	The Strict Equality Comparison Algorithm	82
11.10	Binary Bitwise Operators	82
11.11	Binary Logical Operators	83
11.12	Conditional Operator (? :)	84
11.13	Assignment Operators	84
11.13.1	Simple Assignment (=)	85
11.13.2	Compound Assignment (op=)	85
11.14	Comma Operator (,)	85
12	Statements	86

12.1	Block	86
12.2	Variable Statement	87
12.2.1	Strict Mode Restrictions	88
12.3	Empty Statement	88
12.4	Expression Statement	89
12.5	The if Statement	89
12.6	Iteration Statements	89
12.6.1	The do-while Statement	90
12.6.2	The while Statement	90
12.6.3	The for Statement	90
12.6.4	The for-in Statement	91
12.7	The continue Statement	92
12.8	The break Statement	93
12.9	The return Statement	93
12.10	The with Statement	93
12.10.1	Strict Mode Restrictions	94
12.11	The switch Statement	94
12.12	Labelled Statements	96
12.13	The throw Statement	96
12.14	The try Statement	96
12.14.1	Strict Mode Restrictions	97
12.15	The debugger statement	97
13	Function Definition	98
13.1	Strict Mode Restrictions	99
13.2	Creating Function Objects	99
13.2.1	[[Call]]	100
13.2.2	[[Construct]]	100
13.2.3	The [[ThrowTypeError]] Function Object	100
14	Program	101
14.1	Directive Prologues and the Use Strict Directive	101
15	Standard Built-in ECMAScript Objects	102
15.1	The Global Object	103
15.1.1	Value Properties of the Global Object	103
15.1.2	Function Properties of the Global Object	104
15.1.3	URI Handling Function Properties	105
15.1.4	Constructor Properties of the Global Object	110
15.1.5	Other Properties of the Global Object	111
15.2	Object Objects	111
15.2.1	The Object Constructor Called as a Function	111
15.2.2	The Object Constructor	112
15.2.3	Properties of the Object Constructor	112
15.2.4	Properties of the Object Prototype Object	115
15.2.5	Properties of Object Instances	117
15.3	Function Objects	117
15.3.1	The Function Constructor Called as a Function	117
15.3.2	The Function Constructor	117
15.3.3	Properties of the Function Constructor	118
15.3.4	Properties of the Function Prototype Object	118
15.3.5	Properties of Function Instances	121
15.4	Array Objects	122
15.4.1	The Array Constructor Called as a Function	122
15.4.2	The Array Constructor	123
15.4.3	Properties of the Array Constructor	123
15.4.4	Properties of the Array Prototype Object	124
15.4.5	Properties of Array Instances	140
15.5	String Objects	141
15.5.1	The String Constructor Called as a Function	141
15.5.2	The String Constructor	142
15.5.3	Properties of the String Constructor	142

15.5.4	Properties of the String Prototype Object	142
15.5.5	Properties of String Instances	152
15.6	Boolean Objects	152
15.6.1	The Boolean Constructor Called as a Function	152
15.6.2	The Boolean Constructor	152
15.6.3	Properties of the Boolean Constructor	153
15.6.4	Properties of the Boolean Prototype Object	153
15.6.5	Properties of Boolean Instances	154
15.7	Number Objects	154
15.7.1	The Number Constructor Called as a Function	154
15.7.2	The Number Constructor	154
15.7.3	Properties of the Number Constructor	154
15.7.4	Properties of the Number Prototype Object	155
15.7.5	Properties of Number Instances	159
15.8	The Math Object	159
15.8.1	Value Properties of the Math Object	159
15.8.2	Function Properties of the Math Object	161
15.9	Date Objects	165
15.9.1	Overview of Date Objects and Definitions of Abstract Operators	165
15.9.2	The Date Constructor Called as a Function	171
15.9.3	The Date Constructor	171
15.9.4	Properties of the Date Constructor	172
15.9.5	Properties of the Date Prototype Object	173
15.9.6	Properties of Date Instances	181
15.10	RegExp (Regular Expression) Objects	181
15.10.1	Patterns	181
15.10.2	Pattern Semantics	183
15.10.3	The RegExp Constructor Called as a Function	195
15.10.4	The RegExp Constructor	195
15.10.5	Properties of the RegExp Constructor	196
15.10.6	Properties of the RegExp Prototype Object	196
15.10.7	Properties of RegExp Instances	198
15.11	Error Objects	198
15.11.1	The Error Constructor Called as a Function	199
15.11.2	The Error Constructor	199
15.11.3	Properties of the Error Constructor	199
15.11.4	Properties of the Error Prototype Object	199
15.11.5	Properties of Error Instances	200
15.11.6	Native Error Types Used in This Standard	200
15.11.7	NativeError Object Structure	201
15.12	The JSON Object	203
15.12.1	The JSON Grammar	203
15.12.2	parse (text [, reviver])	204
15.12.3	stringify (value [, replacer [, space]])	206
16	Errors	209
Annex A (informative) Grammar Summary		211
Annex B (informative) Compatibility		230
Annex C (informative) The Strict Mode of ECMAScript		234
Annex D (informative) Corrections and Clarifications in the 3rd Edition with Possible 2nd Edition Compatibility Impact		236
Annex E (informative) Additions and Changes in the 3rd Edition that Introduce Incompatibilities with the 2nd Edition		237
Bibliography		240