

Auto-Validation System - Master Documentation

Project: VBA Excel Auto-Validation Framework

Version: 2.6 (Header-Based Architecture Complete)

Last Updated: 2026-01-21

Status: Phase 2 Complete - Header-Based Architecture Fully Implemented

Change Log

[2.6.0] - 2026-01-21 - Header-Based Architecture Complete

Status: Complete

Major Milestone: Complete Transition from Column Letters to Header Names

All modules have been updated to use header-based cell lookups instead of column letters. This is a significant architectural improvement that makes the system resilient to column insertions/deletions and improves maintainability.

Key Changes by Module:

AV_Core v2.6

- ✓ `GetAutoValidationMap()` now reads `"ReviewSheet Column Header"` instead of `"ReviewSheet Column Letter"`
- ✓ `GetDDMValidationColumns()` now reads `"ReviewSheet Column Name"` for header-based lookup
- ✓ `GetValidMenuValues()` uses header-based table lookup instead of column letters
- ✓ **NEW:** `GetCellByHeader(TargetTable, rowNum, headerName)` - Central helper for header-based cell access
- ✓ All dictionary assignments use proper `Set` keyword (Error #450 fix retained)

AV_Engine v2.6

- ✓ `ENGINE_VERSION = "2.6"` constant for version tracking
- ✓ **NEW:** `CurrentTargetTable As ListObject` - Public variable for cross-module table access
- ✓ `ValidateSingleRow()` uses `GetCellByHeader()` for all cell lookups
- ✓ `RunAutoCheckDataValidation()` converted to header-based cell access
- ✓ `PrintHeaderDiagnostics()` outputs mapping verification to Immediate Window
- ✓ All `Range(colLetter & rowNum)` patterns replaced with header lookups

AV_Validators v2.6


- ✓ `GetSiblingCell()` now uses `"ReviewSheet Column Header"` instead of `"ReviewSheet Column Letter"`
- ✓ Uses `AV_Engine.CurrentTargetTable` for table reference
- ✓ Falls back to `AV_Core.GetCellByHeader()` for all lookups
- ✓ Passes `AutoValMap` to all validation rule calls for cached header access

AV_Format v2.6

- ✓ `WriteSystemTagToDropColumn()` accepts `ListObject` and header names
- ✓ `AddValidationFeedback()` uses `AV_Engine.CurrentTargetTable` for lookups
- ✓ All drop column operations use header-based access
- ✓ Source cell formatting uses header-based lookup

AV_ValidationRules v2.5

- ✓ All validators pass `AutoValMap` to `GetSiblingCell()` for header resolution
- ✓ `ValidatePairedFields()` uses header-based sibling cell lookup
- ✓ `Validate_HeatPairs()` uses header-based cell access

-  All `AddValidationFeedback()` calls work with header-based architecture

Breaking Changes: None - maintains backward compatibility



Configuration Table Changes:

- `AutoValidationCommentPrefixMappingTable` now requires `"ReviewSheet Column Header"` column (header name, not letter)
 - `AutoCheckDataValidationTable` uses `"ReviewSheet Column Name"` for target column identification
-

[2.5.0] - 2026-01-21 - Critical Bug Fixes & Performance Optimization

Status: Complete

Critical Fixes:

-  **Resolved Error #450** - Fixed Dictionary object assignment syntax (`Set dict(key) = item`)
-  **14.6x Performance Improvement** - Validation time reduced from 467 seconds to 32 seconds

Optimization Techniques Applied:

- Column index caching in `ValidateSingleRow`
 - `Single Application.EnableEvents` toggle per target (not per row)
 - `DoEvents` every 10 rows instead of every row
 - Cached validation tables
-

[2.4.0] - 2026-01-20 - Table-Based Engine Overhaul

Status: Complete

- Auto-detects target table range from ListObject.DataBodyRange
 - Uses ValidationTargets table for multi-table support
 - Added diagnostic output comparing mapped headers vs actual table headers
-

[2.3.0] - 2026-01-19 - Debug System & Logging

Status: Complete

- Dual-mode debug system (user progress vs developer debug)
 - GlobalDebugOptions table controls system-wide debug output
 - ValidationTrackerForm always shows progress for users
-

[2.0.0 - 2.2.0] - Architecture Consolidation

Status: Complete

- Consolidated 15-20 modules into 6 core modules
 - Created AV_Constants and AV_DataAccess modules
 - Table caching implemented
-





Project Vision & Goals

Primary Objectives

1. **Maintain Functionality** - All existing validations work correctly
2. **Header-Based Configuration** - No hardcoded column letters anywhere

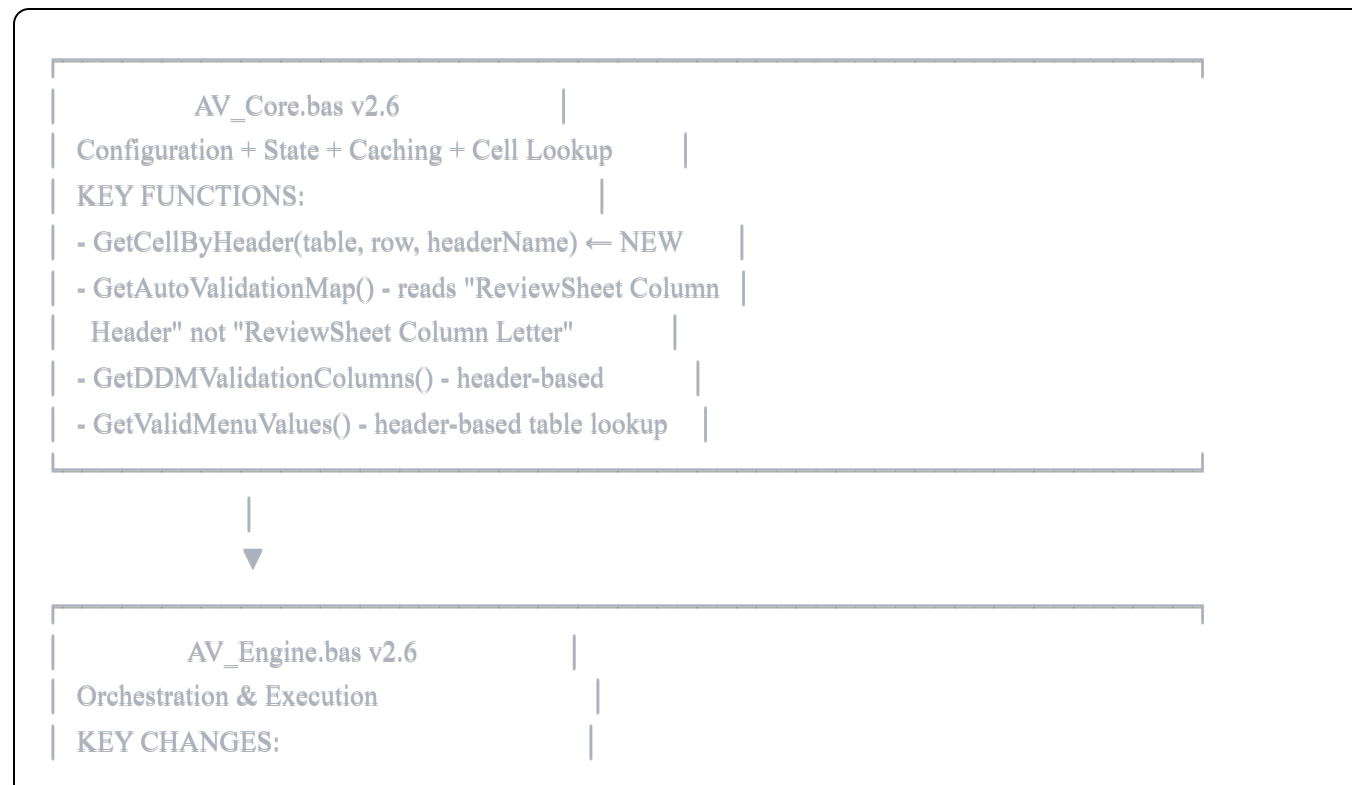
3. **Performance** - <35 seconds for ~2000 rows
4. **Reusability** - Support multiple validation targets with different structures

Achieved in v2.6

-  Complete elimination of column letter references in core validation logic
 -  Table-driven configuration throughout
 -  Cross-module table sharing via `AV_Engine.CurrentTargetTable`
 -  Centralized cell lookup via `AV_Core.GetCellByHeader()`
-

Architecture (v2.6)

Module Structure



- CurrentTargetTable As ListObject ← PUBLIC
- ValidateSingleRow() uses GetCellByHeader()
- RunAutoCheckDataValidation() header-based
- PrintHeaderDiagnostics() for mapping verification



AV_Validators.bas v2.6	AV_Format.bas v2.6
Routing Layer	Formatting & Feedback
KEY CHANGES:	KEY CHANGES:
- GetSiblingCell() now uses header names	- WriteSystemTagTo DropColumn() accepts
- Uses CurrentTarget Table from AV_Engine	ListObject + headers
	- Uses CurrentTarget
	Table for lookups



AV_ValidationRules v2.5
Business Logic
- All validators pass AutoValMap for header resolution
- Sibling cell lookups use header names



AV_UI.bas v2.1
User Interface

- ShowValidationTrackerForm |
- AppendUserLog |
- CancelValidation |

Key Data Flow (v2.6)

1. RunFullValidationMaster()

```
|  
├─> Set CurrentTargetTable = tblTarget ← TABLE SHARED GLOBALLY  
├─> FOR EACH row:  
│   └─> ValidateSingleRow()  
│       └─> Get header name from AutoValMap("ColumnRef")  
│           └─> GetCellByHeader(CurrentTargetTable, rowNum, headerName)  
│               └─> Application.Run("Validate_Column_X")  
│                   └─> GetSiblingCell(cell, sheet, "OtherFunc", AutoValMap)  
│                       └─> Uses CurrentTargetTable + GetCellByHeader()
```

Configuration Tables Reference

Critical Configuration Changes for v2.6

AutoValidationCommentPrefixMappingTable

IMPORTANT: This table now uses "ReviewSheet Column Header" instead of "ReviewSheet Column Letter"

Column	Type	Description	Example
Dev Function Names	String	Function identifier	"Electricity"
Drop in Column	String	Header name for messages column	"National Review Comments"
Prefix to message	String	English message prefix	"Electricity"
(FR) Prefix to message	String	French message prefix	"Électricité"
RuleTableName	String	Associated rule table	"ElectricityPairValidation"
AutoValidate	Boolean	TRUE to enable	TRUE
ReviewSheet Column Header	String	Header name of column to validate	"Electricity"

Current Mappings (9 validators):

Dev Function Names	ReviewSheet Column Header	RuleTableName
GIWQuantity	Gender Inclusive Washrooms - Quantity	GIWValidationTable
GIWIncluded	Gender Inclusive Washrooms - Included	GIWValidationTable
Electricity	Electricity	ElectricityPairValidation
Electricity_Metered	Electricity Metered	ElectricityPairValidation
Plumbing	Plumbing	PlumbingPairValidation
Water_Metered	Water Metered	PlumbingPairValidation
Heat_Source	Heat Source	HeatSourcePairValidation
Heat_Metered	Heat Metered	HeatSourcePairValidation
Construction_Date	Construction Date	(none)

Note: The " Heat Metered" header has a leading space in the actual table - this must match exactly.

AutoCheckDataValidationTable (Simple Validations)

Uses "ReviewSheet Column Name" for header-based lookup

Column	Type	Description
Column Name	String	English display name
Column Name (FR)	String	French display name
ReviewSheet Column Name	String	Header name in target table
MenuField Column (EN)	String	Valid values column header (EN)
MenuField Column (FR)	String	Valid values column header (FR)
AutoCheck	Boolean	TRUE to enable
AutoComment Column	String	Drop column header for messages

ValidationTargets Table

Column	Type	Description
TableName	String	ListObject name
Enabled	Boolean	TRUE to validate
Mode	String	"Both", "Trigger", or "Bulk"
Key Column (Header Name)	String	Key column header (e.g., "AO ID")

Current Configuration:

TableName	Enabled	Mode	Key Column (Header Name)
REP2DSMDraft_Buildings	TRUE	Both	AO ID
REP2DSMDraft_Works	TRUE	Both	AO ID
REP2DSMDraft_Other	TRUE	Both	AO ID

Validation Rule Tables

All rule tables remain unchanged from v2.5:

1. **GIWValidationTable** - GIW Included/Quantity rules
2. **ElectricityPairValidation** - Electricity/Metered valid pairs
3. **PlumbingPairValidation** - Plumbing/Water Metered pairs
4. **HeatSourcePairValidation** - Heat Source/Metered pairs
5. **HeatSourceANYRefTable** - Heat ANY mapping

Cell Lookup Architecture (v2.6)

The GetCellByHeader Pattern

All cell lookups in v2.6 use this central function:

vba

' AV_Core.GetCellByHeader

Public Function GetCellByHeader(TargetTable **As** ListObject, rowNum **As** Long, headerName **As** String) **As** Range

' Returns cell at intersection of header column and worksheet row

If TargetTable **Is** Nothing **Then** Exit Function

If Len(headerName) = 0 **Then** Exit Function

' Get column index by header name

Dim colIndex **As** Long

On Error Resume Next

colIndex = TargetTable.ListColumns(headerName).Index

On Error GoTo 0

If colIndex = 0 **Then** Exit Function

' Convert worksheet row to table row

Dim tableRow **As** Long

tableRow = rowNum - TargetTable.DataBodyRange.Row + 1

If tableRow < 1 **Or** tableRow > TargetTable.ListRows.Count **Then** Exit Function

Set GetCellByHeader = TargetTable.DataBodyRange(tableRow, colIndex)

End Function

Cross-Module Table Sharing

vba

```
' AV_Engine sets the table reference
Public CurrentTargetTable As ListObject

' In ProcessValidationTarget:
Set CurrentTargetTable = tblTarget

' Other modules use it:
' AV_Validators.GetSiblingCell:
Set GetSiblingCell = AV_Core.GetCellByHeader(AV_Engine.CurrentTargetTable, cell.Row, headerName)

' AV_Format.AddValidationFeedback:
WriteSystemTagToDropColumn AV_Engine.CurrentTargetTable, dropColHeader, targetRow, ...
```

Performance Metrics

Validation Execution Times

Version	Time	Rows	Key Improvement
v1.0 (Original)	~467s	~2000	Baseline
v2.5 (Error #450 fix)	~32s	~2000	14.6x faster
v2.6 (Header-based)	~32s	~2000	Maintains performance

Why Header-Based is Better

Aspect	Column Letters (Old)	Header Names (v2.6)
Column insertion	Breaks all references	No impact

Aspect	Column Letters (Old)	Header Names (v2.6)
Column deletion	Breaks all references	No impact
Debugging	Hard to trace "M"	Clear "Electricity"
Configuration	Fragile	Robust
Maintenance	High effort	Low effort

Complete Module Inventory (v2.6)

Module	Version	Lines	Status	Key Changes in v2.6
AV_Core	2.6	~630	✓ Complete	GetCellByHeader(), header-based map loading
AV_Engine	2.6	~500	✓ Complete	CurrentTargetTable, header-based ValidateSingleRow
AV_Format	2.6	~560	✓ Complete	Header-based WriteSystemTagToDropColumn
AV_Validators	2.6	~150	✓ Complete	Header-based GetSiblingCell
AV_ValidationRules	2.5	~730	✓ Complete	Works with header-based architecture
AV_UI	2.1	~140	✓ Stable	No changes needed
AV_DataAccess	2.2	~350	✓ Stable	Supplementary functions

Module	Version	Lines	Status	Key Changes in v2.6
ValidationTrackerForm	2.1	~150	✓ Stable	No changes needed

Total: ~3,200+ lines across 8 components

Testing Checklist (v2.6)

Version Verification

```
vba

Sub CheckVersions()
    Debug.Print "AV_Engine version: " & AV_Engine.ENGINE_VERSION
    ' Expected: 2.6
End Sub
```

Header Mapping Verification

When validation runs, the Immediate Window shows:

```
-----
DIAGNOSTIC: Header Mapping Check
-----

OK: Validate_Column_Electricity -> 'Electricity' found at index 22
OK: Validate_Column_Construction_Date -> 'Construction Date' found at index 7
MISSING: Validate_Column_Heat_Metered -> ' Heat Metered' NOT in table
```

Functional Tests

- ☐ Run full validation on REP2DSMDraft_Buildings
- ☐ Verify GIW Quantity/Included pair validation works

- ☐ Verify auto-corrections apply correctly
- ☐ Verify SYS_TAG messages appear in drop column
- ☐ Verify formatting (Error, Autocorrect, Default) applies
- ☐ Verify key column priority formatting
- ☐ Test with French language option

Regression Tests

- ☐ No Error #450 on GetAutoValidationMap
- ☐ No column letter references in validation logic
- ☐ ~32 seconds for ~2000 rows
- ☐ Cancel button works



Known Issues & Technical Debt

Resolved in v2.6






Issue	Status	Resolution
Column letter brittleness	✓ RESOLVED	Header-based lookups
GetSiblingCell using column letters	✓ RESOLVED	Uses AutoValMap + GetCellByHeader
Error #450 Dictionary assignment	✓ RESOLVED	Added Set keyword
Slow validation (~467s)	✓ RESOLVED	Caching + event optimization

Remaining Low-Priority Items

Issue	Priority	Status
Heat Metered leading space in header	Low	Document only - must match config
EN/FR language switching	Low	Functional but not fully tested
ForceValidationTable full implementation	Low	Basic filtering works

Development Roadmap

Phase 2: Complete

-  Table-based configuration
-  Centralized constants
-  Data access layer
-  Performance optimization (14.6x)
-  **Header-based architecture (v2.6)**

Phase 3: Planned

- Production testing with real data
- EN/FR language verification
- ForceValidationTable enhancement
- Additional validation rules as needed

Phase 4: Future 📅

- Generic validation engine
- Multi-workbook support
- Validation function registry

📖 Quick Reference

Key Code Locations (v2.6)

Function	Location	Description
Main Entry	AV_Engine.RunFullValidationMaster()	Starts validation
Cell Lookup	AV_Core.GetCellByHeader()	Header-based cell access
Current Table	AV_Engine.CurrentTargetTable	Shared table reference
Sibling Cell	AV_Validators.GetSiblingCell()	Finds pair cell by header
Feedback	AV_Format.AddValidationFeedback()	Writes messages
Tag Writing	AV_Format.WriteSystemTagToDropColumn()	SYS_TAG management

Configuration Table Dependencies



↳ RuleTableName → Validation rules
↳ ElectricityPairValidation
↳ GIWValidationTable
↳ etc.

Appendix A: Migration Notes

Migrating from v2.5 to v2.6

1. Update AutoValidationCommentPrefixMappingTable

- Ensure "ReviewSheet Column Header" column exists with header names (not letters)

2. Update AutoCheckDataValidationTable

- Ensure "ReviewSheet Column Name" contains header names

3. Import Updated Modules

- AV_Core v2.6
- AV_Engine v2.6
- AV_Validators v2.6
- AV_Format v2.6

4. Verify Headers Match

- Run validation and check Immediate Window for MISSING headers
 - Fix any mismatches (case-sensitive, including leading/trailing spaces)
-

Appendix B: Error Reference

Error	Cause	Solution
#450	Missing <code>Set</code> for object assignment	Use <code>Set dict(key) = item</code>
#91	Object variable not set	Check object Is Not Nothing
Column not found	Header mismatch	Verify exact header name in table
GetSiblingCell returns Nothing	Header not in AutoValMap	Check "ReviewSheet Column Header"

END OF MASTER DOCUMENTATION v2.6

This is a living document. Update the changelog at the top when making significant changes.