

Namespace MB.Common.Aspects

Classes

[LogAspect](#)

An aspect that logs method entry, exit, and exceptions using Serilog. This aspect can be applied to methods to automatically log their execution lifecycle.

Class LogAspect

Namespace: [MB.Common.Aspects](#)

Assembly: MB.Common.dll

An aspect that logs method entry, exit, and exceptions using Serilog. This aspect can be applied to methods to automatically log their execution lifecycle.

```
public sealed class LogAspect : OnMethodBoundaryAspect, _Attribute
```

Inheritance

[object](#) ← [Attribute](#) ← OnMethodBoundaryAspect ← LogAspect

Implements

[Attribute](#)

Inherited Members

[OnMethodBoundaryAspect.CompileTimeValidate\(MethodBase\)](#) ,
[OnMethodBoundaryAspect.AttributeTargetMemberAttributes](#) ,
[OnMethodBoundaryAspect.NamespaceFilter](#) , [OnMethodBoundaryAspect.TypeNameFilter](#) ,
[OnMethodBoundaryAspect.MethodNameFilter](#) , [Attribute.GetCustomAttributes\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo\)](#) , [Attribute.GetCustomAttributes\(MemberInfo, bool\)](#) ,
[Attribute.IsDefined\(MemberInfo, Type\)](#) , [Attribute.IsDefined\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo\)](#) , [Attribute.GetCustomAttributes\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, bool\)](#) , [Attribute.IsDefined\(ParameterInfo, Type\)](#) ,
[Attribute.IsDefined\(ParameterInfo, Type, bool\)](#) , [Attribute.GetCustomAttribute\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Module, Type\)](#) , [Attribute.GetCustomAttributes\(Module\)](#) ,
[Attribute.GetCustomAttributes\(Module, bool\)](#) , [Attribute.GetCustomAttributes\(Module, Type, bool\)](#) ,
[Attribute.IsDefined\(Module, Type\)](#) , [Attribute.IsDefined\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(Module, Type\)](#) , [Attribute.GetCustomAttribute\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttributes\(Assembly\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, bool\)](#) , [Attribute.IsDefined\(Assembly, Type\)](#) ,
[Attribute.IsDefined\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttribute\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttribute\(Assembly, Type, bool\)](#) , [Attribute.Equals\(object\)](#) ,

[Attribute.GetHashCode\(\)](#) , [Attribute.Match\(object\)](#) , [Attribute.IsDefaultAttribute\(\)](#) ,
[Attribute.TypeId](#) , [object.ToString\(\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetType\(\)](#)

Constructors

LogAspect()

```
public LogAspect()
```

Methods

OnEntry(MethodExecutionArgs)

Called before the execution of the target method. Logs the entry into the method with timestamp.

```
public override void OnEntry(MethodExecutionArgs args)
```

Parameters

args MethodExecutionArgs

Provides context about the method being executed.

OnException(MethodExecutionArgs)

Called when an exception is thrown during method execution. Logs the exception details.

```
public override void OnException(MethodExecutionArgs args)
```

Parameters

args MethodExecutionArgs

Provides context about the method and the thrown exception.

OnExit(MethodExecutionArgs)

Called after the successful execution of the target method. Logs the exit of the method with timestamp.

```
public override void OnExit(MethodExecutionArgs args)
```

Parameters

args MethodExecutionArgs

Provides context about the method that was executed.

Namespace MB.Common.Attributes

Classes

[ErrorInformationAttribute](#)

An attribute used to annotate fields with additional error information. This is useful for attaching meaningful error messages or metadata to enum fields or other constants.

[GuidAttribute](#)

Represents a custom attribute that can be applied to fields to associate them with a specific GUID.

[RequiredSharedParametersAttribute](#)

Represents an attribute to specify required shared parameters for a given target.

[RevitCategoriesAttribute](#)

Represents an attribute to associate a target with a set of Revit built-in categories.

[SharedParameterTypeAttribute](#)

Represents an attribute to specify the type of a shared parameter.

Class ErrorInformationAttribute

Namespace: [MB.Common.Attributes](#)

Assembly: MB.Common.dll

An attribute used to annotate fields with additional error information. This is useful for attaching meaningful error messages or metadata to enum fields or other constants.

```
[AttributeUsage(AttributeTargets.Field)]
public class ErrorInformationAttribute : Attribute, _Attribute
```

Inheritance

[object](#) ← [Attribute](#) ← ErrorInformationAttribute

Implements

[Attribute](#)

Inherited Members

[Attribute.GetCustomAttributes\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo\)](#) , [Attribute.GetCustomAttributes\(MemberInfo, bool\)](#) ,
[Attribute.IsDefined\(MemberInfo, Type\)](#) , [Attribute.IsDefined\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo\)](#) , [Attribute.GetCustomAttributes\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, bool\)](#) , [Attribute.IsDefined\(ParameterInfo, Type\)](#) ,
[Attribute.IsDefined\(ParameterInfo, Type, bool\)](#) , [Attribute.GetCustomAttribute\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Module, Type\)](#) , [Attribute.GetCustomAttributes\(Module\)](#) ,
[Attribute.GetCustomAttributes\(Module, bool\)](#) , [Attribute.GetCustomAttributes\(Module, Type, bool\)](#) ,
[Attribute.IsDefined\(Module, Type\)](#) , [Attribute.IsDefined\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(Module, Type\)](#) , [Attribute.GetCustomAttribute\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttributes\(Assembly\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, bool\)](#) , [Attribute.IsDefined\(Assembly, Type\)](#) ,
[Attribute.IsDefined\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttribute\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttribute\(Assembly, Type, bool\)](#) , [Attribute.Equals\(object\)](#) ,
[Attribute.GetHashCode\(\)](#) , [Attribute.Match\(object\)](#) , [Attribute.IsDefaultAttribute\(\)](#) ,

[Attribute.TypeId](#) , [object.ToString\(\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Constructors

ErrorInformationAttribute(string)

Initializes a new instance of the [ErrorInformationAttribute](#) class with the specified error information string.

```
public ErrorInformationAttribute(string errorInformation)
```

Parameters

errorInformation [string](#)

The error information to associate with the field.

Properties

ErrorInformation

Gets the error information message associated with the field.

```
public string ErrorInformation { get; }
```

Property Value

[string](#)

Class GuidAttribute

Namespace: [MB.Common.Attributes](#)

Assembly: MB.Common.dll

Represents a custom attribute that can be applied to fields to associate them with a specific GUID.

```
[AttributeUsage(AttributeTargets.Field)]
public class GuidAttribute : Attribute, _Attribute
```

Inheritance

[object](#) ← [Attribute](#) ← GuidAttribute

Implements

[Attribute](#)

Inherited Members

[Attribute.GetCustomAttributes\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo\)](#) , [Attribute.GetCustomAttributes\(MemberInfo, bool\)](#) ,
[Attribute.IsDefined\(MemberInfo, Type\)](#) , [Attribute.IsDefined\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo\)](#) , [Attribute.GetCustomAttributes\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, bool\)](#) , [Attribute.IsDefined\(ParameterInfo, Type\)](#) ,
[Attribute.IsDefined\(ParameterInfo, Type, bool\)](#) , [Attribute.GetCustomAttribute\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Module, Type\)](#) , [Attribute.GetCustomAttributes\(Module\)](#) ,
[Attribute.GetCustomAttributes\(Module, bool\)](#) , [Attribute.GetCustomAttributes\(Module, Type, bool\)](#) ,
[Attribute.IsDefined\(Module, Type\)](#) , [Attribute.IsDefined\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(Module, Type\)](#) , [Attribute.GetCustomAttribute\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttributes\(Assembly\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, bool\)](#) , [Attribute.IsDefined\(Assembly, Type\)](#) ,
[Attribute.IsDefined\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttribute\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttribute\(Assembly, Type, bool\)](#) , [Attribute.Equals\(object\)](#) ,
[Attribute.GetHashCode\(\)](#) , [Attribute.Match\(object\)](#) , [Attribute.IsDefaultAttribute\(\)](#) ,
[Attribute.TypeId](#) , [object.ToString\(\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Remarks

This attribute allows developers to tag fields with a GUID value, which can then be used for identification, serialization, or other purposes where a globally unique identifier is required.

Constructors

GuidAttribute(string)

Initializes a new instance of the [GuidAttribute](#) class with the specified GUID string.

```
public GuidAttribute(string guid)
```

Parameters

guid [string](#)

The GUID string to associate with the field. Must be in a valid GUID format.

Exceptions

[FormatException](#)

Thrown when the provided string is not in a valid GUID format.

Properties

Guid

Gets the GUID associated with the field to which this attribute is applied.

```
public string Guid { get; }
```

Property Value

[string](#)

Class RequiredSharedParametersAttribute

Namespace: [MB.Common.Attributes](#)

Assembly: MB.Common.dll

Represents an attribute to specify required shared parameters for a given target.

```
[AttributeUsage(AttributeTargets.Field)]
public class RequiredSharedParametersAttribute : Attribute, _Attribute
```

Inheritance

[object](#) ← [Attribute](#) ← RequiredSharedParametersAttribute

Implements

[Attribute](#)

Inherited Members

[Attribute.GetCustomAttributes\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo\)](#) , [Attribute.GetCustomAttributes\(MemberInfo, bool\)](#) ,
[Attribute.IsDefined\(MemberInfo, Type\)](#) , [Attribute.IsDefined\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo\)](#) , [Attribute.GetCustomAttributes\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, bool\)](#) , [Attribute.IsDefined\(ParameterInfo, Type\)](#) ,
[Attribute.IsDefined\(ParameterInfo, Type, bool\)](#) , [Attribute.GetCustomAttribute\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Module, Type\)](#) , [Attribute.GetCustomAttributes\(Module\)](#) ,
[Attribute.GetCustomAttributes\(Module, bool\)](#) , [Attribute.GetCustomAttributes\(Module, Type, bool\)](#) ,
[Attribute.IsDefined\(Module, Type\)](#) , [Attribute.IsDefined\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(Module, Type\)](#) , [Attribute.GetCustomAttribute\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttributes\(Assembly\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, bool\)](#) , [Attribute.IsDefined\(Assembly, Type\)](#) ,
[Attribute.IsDefined\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttribute\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttribute\(Assembly, Type, bool\)](#) , [Attribute.Equals\(object\)](#) ,
[Attribute.GetHashCode\(\)](#) , [Attribute.Match\(object\)](#) , [Attribute.IsDefaultAttribute\(\)](#) ,
[Attribute.TypeId](#) , [object.ToString\(\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Remarks

This attribute allows developers to declare a set of shared parameters that are required for the functionality or configuration of a specific target (e.g., class, method, or property).

Constructors

RequiredSharedParametersAttribute(params ToolsSharedParameter[])

Initializes a new instance of the [RequiredSharedParametersAttribute](#) class.

```
public RequiredSharedParametersAttribute(params ToolsSharedParameter[] sharedParameters)
```

Parameters

sharedParameters [ToolsSharedParameter\[\]](#)

A variable-length array of [ToolsSharedParameter](#) objects that represent the required shared parameters.

Exceptions

ArgumentNullException

Thrown if the provided `sharedParameters` array is null.

Properties

SharedParameters

Gets the array of shared parameters that are required.

```
public ToolsSharedParameter[] SharedParameters { get; }
```

Property Value

[ToolsSharedParameter\[\]](#)

Class RevitCategoriesAttribute

Namespace: [MB.Common.Attributes](#)

Assembly: MB.Common.dll

Represents an attribute to associate a target with a set of Revit built-in categories.

```
[AttributeUsage(AttributeTargets.Field)]
public class RevitCategoriesAttribute : Attribute, _Attribute
```

Inheritance

[object](#) ← [Attribute](#) ← RevitCategoriesAttribute

Implements

[Attribute](#)

Inherited Members

[Attribute.GetCustomAttributes\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo\)](#) , [Attribute.GetCustomAttributes\(MemberInfo, bool\)](#) ,
[Attribute.IsDefined\(MemberInfo, Type\)](#) , [Attribute.IsDefined\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo\)](#) , [Attribute.GetCustomAttributes\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, bool\)](#) , [Attribute.IsDefined\(ParameterInfo, Type\)](#) ,
[Attribute.IsDefined\(ParameterInfo, Type, bool\)](#) , [Attribute.GetCustomAttribute\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Module, Type\)](#) , [Attribute.GetCustomAttributes\(Module\)](#) ,
[Attribute.GetCustomAttributes\(Module, bool\)](#) , [Attribute.GetCustomAttributes\(Module, Type, bool\)](#) ,
[Attribute.IsDefined\(Module, Type\)](#) , [Attribute.IsDefined\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(Module, Type\)](#) , [Attribute.GetCustomAttribute\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttributes\(Assembly\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, bool\)](#) , [Attribute.IsDefined\(Assembly, Type\)](#) ,
[Attribute.IsDefined\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttribute\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttribute\(Assembly, Type, bool\)](#) , [Attribute.Equals\(object\)](#) ,
[Attribute.GetHashCode\(\)](#) , [Attribute.Match\(object\)](#) , [Attribute.IsDefaultAttribute\(\)](#) ,
[Attribute.TypeId](#) , [object.ToString\(\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Remarks

This attribute can be used to declare which Revit built-in categories are relevant for a specific class, method, or property. It allows for filtering or categorization based on Revit's predefined categories.

Constructors

RevitCategoriesAttribute(params BuiltInCategory[])

Initializes a new instance of the [RevitCategoriesAttribute](#) class.

```
public RevitCategoriesAttribute(params BuiltInCategory[] categories)
```

Parameters

categories BuiltInCategory[]

A variable-length array of BuiltInCategory enums that represent the relevant Revit categories.

Exceptions

ArgumentNullException

Thrown if the provided **categories** array is null.

Properties

Categories

Gets the array of Revit built-in categories associated with the target.

```
public BuiltInCategory[] Categories { get; }
```

Property Value

BuiltInCategory[]

Class SharedParameterTypeAttribute

Namespace: [MB.Common.Attributes](#)

Assembly: MB.Common.dll

Represents an attribute to specify the type of a shared parameter.

```
[AttributeUsage(AttributeTargets.Class|AttributeTargets.Property|AttributeTargets.Field)]
public class SharedParameterTypeAttribute : Attribute, _Attribute
```

Inheritance

[object](#) ← [Attribute](#) ← SharedParameterTypeAttribute

Implements

[Attribute](#)

Inherited Members

[Attribute.GetCustomAttributes\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(MemberInfo\)](#) , [Attribute.GetCustomAttributes\(MemberInfo, bool\)](#) ,
[Attribute.IsDefined\(MemberInfo, Type\)](#) , [Attribute.IsDefined\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(MemberInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo\)](#) , [Attribute.GetCustomAttributes\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(ParameterInfo, bool\)](#) , [Attribute.IsDefined\(ParameterInfo, Type\)](#) ,
[Attribute.IsDefined\(ParameterInfo, Type, bool\)](#) , [Attribute.GetCustomAttribute\(ParameterInfo, Type\)](#) ,
[Attribute.GetCustomAttribute\(ParameterInfo, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Module, Type\)](#) , [Attribute.GetCustomAttributes\(Module\)](#) ,
[Attribute.GetCustomAttributes\(Module, bool\)](#) , [Attribute.GetCustomAttributes\(Module, Type, bool\)](#) ,
[Attribute.IsDefined\(Module, Type\)](#) , [Attribute.IsDefined\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttribute\(Module, Type\)](#) , [Attribute.GetCustomAttribute\(Module, Type, bool\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttributes\(Assembly\)](#) ,
[Attribute.GetCustomAttributes\(Assembly, bool\)](#) , [Attribute.IsDefined\(Assembly, Type\)](#) ,
[Attribute.IsDefined\(Assembly, Type, bool\)](#) , [Attribute.GetCustomAttribute\(Assembly, Type\)](#) ,
[Attribute.GetCustomAttribute\(Assembly, Type, bool\)](#) , [Attribute.Equals\(object\)](#) ,
[Attribute.GetHashCode\(\)](#) , [Attribute.Match\(object\)](#) , [Attribute.IsDefaultAttribute\(\)](#) ,
[Attribute.TypeId](#) , [object.ToString\(\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Remarks

This attribute is used to associate a target (e.g., a class, method, or property) with a specific shared parameter type. It helps define the type of shared parameter in a structured and reusable way.

Constructors

SharedParameterTypeAttribute(SharedParameterType)

Initializes a new instance of the [SharedParameterTypeAttribute](#) class.

```
public SharedParameterTypeAttribute(SharedParameterType type)
```

Parameters

type [SharedParameterType](#)

The [SharedParameterType](#) to associate with the target.

Exceptions

ArgumentNullException

Thrown if the provided **type** is null (only if SharedParameterType is a reference type).

Properties

Type

Gets the type of the shared parameter associated with this attribute.

```
public SharedParameterType Type { get; }
```

Property Value

[SharedParameterType](#)

Namespace MB.Common.Comparers

Classes

[BoundingBoxComparer](#)

A utility class for comparing and resolving bounding box coordinates from multiple points.

Class BoundingBoxComparer

Namespace: [MB.Common.Comparers](#)

Assembly: MB.Common.dll

A utility class for comparing and resolving bounding box coordinates from multiple points.

```
public class BoundingBoxComparer
```

Inheritance

[object](#) ← BoundingBoxComparer

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

BoundingBoxComparer()

Initializes a new instance of the [BoundingBoxComparer](#) class. Sets initial values for bounds: maximum values for minimum bounds and minimum values for maximum bounds.

```
public BoundingBoxComparer()
```

Methods

Compare(XYZ)

Compares the given point with the current bounds and updates the bounds accordingly.

```
public void Compare(XYZ point)
```

Parameters

point XYZ

The 3D point to compare.

Resolve()

Resolves the current bounds into a minimum and maximum point, extending them by a fixed tolerance.

```
public (XYZ min, XYZ max) Resolve()
```

Returns

(XYZ [Perpendicular](#), XYZ [Normal](#))

A tuple containing:

- The minimum point (Autodesk.Revit.DB.XYZ) of the bounding box.
- The maximum point (Autodesk.Revit.DB.XYZ) of the bounding box.

Namespace MB.Common.Constants

Classes

[FilePaths](#)

Contains static file paths and predefined constants used throughout the application. Paths are based on the user's local application data folder.

[MbErrorMessages](#)

Contains predefined error message constants used throughout the application. Helps maintain consistency and manageability of user-facing messages.

[MbfFiles](#)

Provides constants and utility properties for MBF-related file paths.

[MbfGroups](#)

Provides constant values for MBF parameter groups.

Class FilePaths

Namespace: [MB.Common.Constants](#)

Assembly: MB.Common.dll

Contains static file paths and predefined constants used throughout the application. Paths are based on the user's local application data folder.

```
public static class FilePaths
```

Inheritance

[object](#) ← FilePaths

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

Elbows

Constant for identifying elbow elements.

```
public const string Elbows = "Elbows"
```

Field Value

[string](#)

FlexPipes

Constant for identifying flexible pipe elements.

```
public const string FlexPipes = "Flex Pipes"
```

Field Value

[string](#)

HazardCoverageJson

Constant for identifying pipe elements.

```
public const string HazardCoverageJson = "HazardCoverage.json"
```

Field Value

[string](#)

LogBaseDirectory

Gets the base directory path where log files are stored.

```
public static readonly string LogBaseDirectory
```

Field Value

[string](#)

Remarks

The directory path is constructed by combining the local application data folder, a subdirectory named "MicroBIM", and a "Logs" folder. This path is intended to provide a consistent location for storing application log files.

Others

Constant for identifying miscellaneous or other elements.

```
public const string Others = "Others"
```

Field Value

[string](#)

Outlets

Constant for identifying outlet elements.

```
public const string Outlets = "Outlets"
```

Field Value

[string](#)

PipeAccessories

Constant for identifying pipe accessory elements.

```
public const string PipeAccessories = "Pipe Accessories"
```

Field Value

[string](#)

Pipes

Constant for identifying pipe elements.

```
public const string Pipes = "Pipes"
```

Field Value

[string](#)

Sprinklers

Constant for identifying sprinkler elements.

```
public const string Sprinklers = "Sprinklers"
```

Field Value

[string](#)

Tees

Constant for identifying tee elements.

```
public const string Tees = "Tees"
```

Field Value

[string](#)

Properties

AutoSprinklerSpacing

Gets the path to the directory containing Auto Sprinkler Spacing JSON files.

```
public static string AutoSprinklerSpacing { get; }
```

Property Value

[string](#)

ListingSettingsJsons

Gets the path to the directory containing listing-specific Mapper JSON settings.

```
public static string ListingSettingsJsons { get; }
```

Property Value

[string](#)

MapperJsons

Gets the path to the directory containing Mapper JSON files.

```
public static string MapperJsons { get; }
```

Property Value

[string](#)

MicroBimListingSettingsJsons

Gets the path to the directory containing MicroBIM Listing Settings JSON files.

```
public static string MicroBimListingSettingsJsons { get; }
```

Property Value

[string](#)

SettingsJsons

Gets the path to the directory containing general Mapper JSON settings.

```
public static string SettingsJsons { get; }
```

Property Value

[string](#)

UserListing

Gets the path to the directory containing user-specific listing settings JSON files.

```
public static string UserListing { get; }
```

Property Value

[string](#)

UserValuesToStandardJson

Path for mapping user-defined values to a standard JSON format within listing settings.

```
public static string UserValuesToStandardJson { get; }
```

Property Value

[string](#) ↗

Class MbErrorMessages

Namespace: [MB.Common.Constants](#)

Assembly: MB.Common.dll

Contains predefined error message constants used throughout the application. Helps maintain consistency and manageability of user-facing messages.

```
public static class MbErrorMessages
```

Inheritance

[object](#) ← MbErrorMessages

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

MoreThanOneSpaceSelected

Error message displayed when more than one space is selected.

```
public const string MoreThanOneSpaceSelected = "Please select only one space."
```

Field Value

[string](#)

NoSpaceSelected

Error message displayed when no space is selected.

```
public const string NoSpaceSelected = "Please select the space."
```

Field Value

[string](#)

NoSprinklerSelected

Error message displayed when no sprinkler is selected.

```
public const string NoSprinklerSelected = "Please select at least one sprinkler."
```

Field Value

[string](#)

SprinklerNotInsideSpace

Error message displayed when a sprinkler is not located within the selected space.

```
public const string SprinklerNotInsideSpace = "Sprinkler is not inside the selected space."
```

Field Value

[string](#)

Class Mbffiles

Namespace: [MB.Common.Constants](#)

Assembly: MB.Common.dll

Provides constants and utility properties for MBF-related file paths.

```
public static class Mbffiles
```

Inheritance

[object](#) ← Mbffiles

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Properties

AddinDirectory

Gets the directory of the currently executing assembly (Add-in directory).

```
public static string AddinDirectory { get; }
```

Property Value

[string](#)

Remarks

This property dynamically resolves the directory path where the executing assembly is located.

ToolsSharedParameter

Gets the full path to the shared parameter file (3dfirespf.txt) used by MBF.

```
public static string ToolsSharedParameter { get; }
```

Property Value

[string](#) ↗

Class MbGroups

Namespace: [MB.Common.Constants](#)

Assembly: MB.Common.dll

Provides constant values for MBF parameter groups.

```
public static class MbGroups
```

Inheritance

[object](#) ← MbGroups

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains group names for organizing parameters used in the MBF suite. These constants can be used to ensure consistent naming throughout the application.

Fields

Fittings

Represents the group name for pipe accessory fittings parameters.

```
public const string Fittings = "MBFire-Pipes-Accessory-Fittings-Parameters"
```

Field Value

[string](#)

Namespace MB.Common.Errors

Classes

[MbErrorExtensions](#)

Provides extension methods for the [MbError](#) enumeration.

Enums

[MbError](#)

Defines a list of error codes used throughout the application. Each enum value is annotated with [Error InformationAttribute](#) to provide a user-friendly error message.

Enum MbError

Namespace: [MB.Common.Errors](#)

Assembly: MB.Common.dll

Defines a list of error codes used throughout the application. Each enum value is annotated with [ErrorInformationAttribute](#) to provide a user-friendly error message.

```
public enum MbError
```

Extension Methods

[MbErrorExtensions.GetErrorMessage\(MbError\)](#)

Fields

[[ErrorInformation\("Please select only one space."\)](#)] MultipleSpacesSelected = 2

Error when more than one space is selected, but only one is expected.

[[ErrorInformation\("Please select the space."\)](#)] NoSpaceSelected = 1

Error when no space is selected by the user.

[[ErrorInformation\("Please select at least one sprinkler."\)](#)] NoSprinklerSelected = 3

Error when no sprinkler is selected.

[[ErrorInformation\("Sprinkler is not inside the selected space."\)](#)] SprinklersNotInsideSpace = 4

Error when selected sprinklers are not located inside the selected space.

Class MbErrorExtensions

Namespace: [MB.Common.Errors](#)

Assembly: MB.Common.dll

Provides extension methods for the [MbError](#) enumeration.

```
public static class MbErrorExtensions
```

Inheritance

[object](#) ← MbErrorExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetErrorMessage(MbError)

Retrieves the error information associated with the specified [MbError](#).

```
public static string GetErrorMessage(this MbError error)
```

Parameters

[error](#) [MbError](#)

The [MbError](#) instance for which the error message is retrieved.

Returns

[string](#)

Namespace MB.Common.Errors.Exceptions

Classes

[MbException](#)

Represents a custom exception type used within the MicroBIM system. Wraps an [MbError](#) and provides a description derived from it.

Class MbException

Namespace: [MB.Common.Errors.Exceptions](#)

Assembly: MB.Common.dll

Represents a custom exception type used within the MicroBIM system. Wraps an [MbError](#) and provides a description derived from it.

```
public class MbException : Exception, ISerializable, _Exception
```

Inheritance

[object](#) ← [Exception](#) ← MbException

Implements

[ISerializable](#), [Exception](#)

Inherited Members

[Exception.GetBaseException\(\)](#), [Exception.ToString\(\)](#),
[Exception.GetObjectData\(SerializationInfo, StreamingContext\)](#), [Exception.GetType\(\)](#),
[Exception.Message](#), [Exception.Data](#), [Exception.InnerException](#), [Exception.TargetSite](#),
[Exception.StackTrace](#), [Exception.HelpLink](#), [Exception.Source](#), [Exception.HResult](#),
[Exception.SerializeObjectState](#), [object.Equals\(object\)](#), [object.Equals\(object, object\)](#),
[object.ReferenceEquals\(object, object\)](#), [object.GetHashCode\(\)](#), [object.MemberwiseClone\(\)](#)

Constructors

MbException(MbError)

Represents a custom exception type used within the MicroBIM system. Wraps an [MbError](#) and provides a description derived from it.

```
public MbException(MbError mbError)
```

Parameters

mbError [MbError](#)

Properties

Description

Gets or sets the human-readable description of the error. This is generated from the associated [MbError](#) using its `GetErrorMessage` method.

```
public string Description { get; set; }
```

Property Value

[string](#) ↗

MbError

Gets or sets the [MbError](#) associated with this exception. This holds structured error information relevant to the exception.

```
public MbError MbError { get; set; }
```

Property Value

[MbError](#)

Namespace MB.Common.Jsons

Classes

[GenericJsonFileService](#)

Provides generic methods for saving and loading JSON files from disk.

Class GenericJsonFileService

Namespace: [MB.Common.Jsons](#)

Assembly: MB.Common.dll

Provides generic methods for saving and loading JSON files from disk.

```
public static class GenericJsonFileService
```

Inheritance

[object](#) ← GenericJsonFileService

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

EnsureFileExists(string)

Ensures that a file exists at the specified path, creating it if necessary.

```
public static MbResult<bool> EnsureFileExists(string filePath)
```

Parameters

filePath [string](#)

The full path of the file to check or create. Must not be null, empty, or whitespace.

Returns

[MbResult<bool>](#)

An [MbResult<T>](#) containing a boolean value indicating success or failure. Returns [true](#) if the file exists or was successfully created; otherwise, returns [false](#) with an error message.

Remarks

If the specified file does not exist, this method creates it along with any necessary directories. The created file will be initialized with an empty JSON array.

Load<T>(string)

Loads JSON data from a file and deserializes it into an object of type **T**.

```
public static MbResult<T> Load<T>(string filePath) where T : new()
```

Parameters

filePath [string](#)

The full path to the JSON file.

Returns

[MbResult](#)<T>

An [MbResult](#)<T> containing the deserialized object, or an empty instance on failure.

Type Parameters

T

The type to deserialize the JSON content into. Must have a parameterless constructor.

Save<T>(T, string)

Saves the given data as JSON to the specified file path.

```
public static MbResult<bool> Save<T>(T data, string filePath)
```

Parameters

data **T**

The data object to serialize and save.

filePath [string](#)

The full path where the file will be saved.

Returns

[MbResult<bool>](#)

An [MbResult<T>](#) indicating success or failure.

Type Parameters

T

The type of the data to serialize.

Remarks

Will automatically create the target directory if it doesn't exist.

Namespace MB.Common.Parameters

Classes

[RevitParameterManager](#)

Manages shared parameters in a Revit document, ensuring required parameters exist and are properly configured.

Class RevitParameterManager

Namespace: [MB.Common.Parameters](#)

Assembly: MB.Common.dll

Manages shared parameters in a Revit document, ensuring required parameters exist and are properly configured.

```
public class RevitParameterManager
```

Inheritance

[object](#) ← RevitParameterManager

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

RevitParameterManager()

```
public RevitParameterManager()
```

Methods

EnsureParameters(Document, ToolsSharedParameter[])

Ensures that a set of shared parameters exists in the given Revit document. If any of the parameters are missing, they will be added during the transaction.

```
public static void EnsureParameters(Document doc, ToolsSharedParameter[] parameters)
```

Parameters

doc Document

The Revit Autodesk.Revit.DB.Document in which the parameters should be ensured.

parameters [ToolsSharedParameter\[\]](#)

An array of [ToolsSharedParameter](#) representing the shared parameters to verify or add.

EnsureParameters(Document, Mbftool)

Ensures that all required shared parameters for a specific tool exist in the Revit document.

```
public static void EnsureParameters(Document doc, Mbftool tool)
```

Parameters

doc Document

The Revit document.

tool [Mbftool](#)

The tool requiring the shared parameters.

Namespace MB.Common.Services

Classes

[EmbeddedResourceService](#)

Provides functionality for accessing and processing embedded resources in assemblies.

[MailService](#)

Provides methods for sending emails, including support for attachments and both synchronous and asynchronous operations.

Class EmbeddedResourceService

Namespace: [MB.Common.Services](#)

Assembly: MB.Common.dll

Provides functionality for accessing and processing embedded resources in assemblies.

```
public static class EmbeddedResourceService
```

Inheritance

[object](#) ← EmbeddedResourceService

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

LoadEmbeddedResourceAsync<T>(string, Assembly)

Loads and deserializes an embedded JSON resource file into a specified type.

```
public static Task<T> LoadEmbeddedResourceAsync<T>(string resourceName, Assembly assembly)
```

Parameters

resourceName [string](#)

The fully qualified name of the embedded resource

assembly [Assembly](#)

Returns

[Task](#)<T>

Deserialized object of type T from the JSON resource

Type Parameters

T

The type to deserialize the JSON content into

Exceptions

FileNotFoundException

Thrown when the specified embedded resource is not found

Class MailService

Namespace: [MB.Common.Services](#)

Assembly: MB.Common.dll

Provides methods for sending emails, including support for attachments and both synchronous and asynchronous operations.

```
public static class MailService
```

Inheritance

[object](#) ← MailService

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

Send(string, List<string>)

Sends an email synchronously with optional attachments. Uses a predefined sender and receiver email configuration.

```
[LogAspect]  
public static void Send(string msg, List<string> attachmentPaths = null)
```

Parameters

msg [string](#)

The body of the email message.

attachmentPaths [List](#)<[string](#)>

Optional list of file paths to attach to the email.

SendAsync(string, List<string>)

Sends an email asynchronously with optional attachments. Useful for avoiding UI blocking during email transmission.

```
[LogAspect]  
public static Task SendAsync(string msg, List<string> attachmentPaths = null)
```

Parameters

msg [string](#)

The body of the email message.

attachmentPaths [List](#)<[string](#)>

Optional list of file paths to attach to the email.

Returns

[Task](#)

Namespace MB.Common.Settings

Classes

[ParameterData](#)

Represents a parameter with a name, display name, and selection state.

Class ParameterData

Namespace: [MB.Common.Settings](#)

Assembly: MB.Common.dll

Represents a parameter with a name, display name, and selection state.

```
public class ParameterData : ObservableObject, INotifyPropertyChanged,  
INotifyPropertyChanging
```

Inheritance

[object](#) ← [ObservableObject](#) ← ParameterData

Implements

[INotifyPropertyChanged](#), [INotifyPropertyChanging](#)

Inherited Members

[ObservableObject.OnPropertyChanged\(PropertyChangedEventArgs\)](#) ,
[ObservableObject.OnPropertyChanging\(PropertyChangingEventArgs\)](#) ,
[ObservableObject.OnPropertyChanged\(string\)](#) , [ObservableObject.OnPropertyChanging\(string\)](#) ,
[ObservableObject SetProperty<T>\(ref T, T, string\)](#) ,
[ObservableObject SetProperty<T>\(ref T, T, IEqualityComparer<T>, string\)](#) ,
[ObservableObject SetProperty<T>\(T, T, Action<T>, string\)](#) ,
[ObservableObject SetProperty<T>\(T, T, IEqualityComparer<T>, Action<T>, string\)](#) ,
[ObservableObject SetProperty<TModel, T>\(T, T, TModel, Action<TModel, T>, string\)](#) ,
[ObservableObject SetProperty<TModel, T>\(T, T, IEqualityComparer<T>, TModel, Action<TModel, T>, string\)](#) ,
[ObservableObject SetPropertyAndNotifyOnCompletion\(ref ObservableObject.TaskNotifier, Task, string\)](#) ,

[ObservableObject SetPropertyAndNotifyOnCompletion\(ref ObservableObject.TaskNotifier, Task, Action<Task>, string\)](#) ,
[ObservableObject SetPropertyAndNotifyOnCompletion<T>\(ref ObservableObject.TaskNotifier<T>, Task<T>, string\)](#) ,
[ObservableObject SetPropertyAndNotifyOnCompletion<T>\(ref ObservableObject.TaskNotifier<T>, Task<T>, Action<Task<T>>, string\)](#) ,
[ObservableObject.PropertyChanged](#) , [ObservableObject.PropertyChanging](#) , [object.ToString\(\)](#) ,
[object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) , [object.ReferenceEquals\(object, object\)](#) ,
[object.GetHashCode\(\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Constructors

ParameterData(string, string, bool)

Represents a parameter with a name, display name, and selection state.

```
public ParameterData(string name, string displayName, bool isSelected = false)
```

Parameters

name [string](#)

The internal name of the parameter.

displayName [string](#)

The display name of the parameter.

isSelected [bool](#)

Indicates whether the parameter is selected.

Properties

DisplayName

```
public string DisplayName { get; set; }
```

Property Value

[string](#)

IsSelected

```
public bool IsSelected { get; set; }
```

Property Value

[bool](#)

Name

```
public string Name { get; set; }
```

Property Value

[string](#) ↗

Namespace MB.Common.Settings.Listing Settings

Classes

[FittingGroupHelper](#)

Provides helper methods for grouping [StandardFittingType](#) values into their corresponding PDF group names for listing and reporting purposes.

[ListingConfig](#)

Represents the configuration for a listing, including elements, family details, category, and fitting types. This class provides constructors to initialize its properties either from a collection of elements or from a Data Transfer Object (DTO).

[ListingDto](#)

Represents a data transfer object for a listing, including details such as family name, symbol name, category, and selected fitting type.

[ListingMapper](#)

Provides methods for mapping between [ListingConfig](#) and [ListingDto](#) objects.

[ListingSettingsHelper](#)

Provides helper methods for working with listing settings, including retrieval of [ListingDto](#) objects based on family and type information.

[MicroBimListingRecommendationDto](#)

Represents a Data Transfer Object (DTO) used for providing recommendations specific to Micro BIM listings.

[StandardFittingGroups](#)

Provides predefined groupings of standard fitting types for different fitting categories.

[ValueToStandardTypeDto](#)

Represents a Data Transfer Object (DTO) that associates a specific value with a standard fitting type.

Enums

[StandardFittingType](#)

Represents a collection of fitting types commonly utilized within piping systems, categorized by different connection methods such as threaded, grooved, embedded couplings, integrated systems (IGS), flanged connections, and more.

Class FittingGroupHelper

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Provides helper methods for grouping [StandardFittingType](#) values into their corresponding PDF group names for listing and reporting purposes.

```
public static class FittingGroupHelper
```

Inheritance

[object](#) ← FittingGroupHelper

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetPdfGroupName(StandardFittingType)

Gets the PDF group name for a specified [StandardFittingType](#).

```
public static string GetPdfGroupName(StandardFittingType type)
```

Parameters

type [StandardFittingType](#)

The fitting type to evaluate.

Returns

[string](#)

The group name as a [string](#) if the type is recognized; otherwise, [null](#). Possible group names include "Threaded Fittings", "Grooved Fittings", "Welded Fittings", "IGS Fittings", "Flanged Fittings", and "Loose Outlets".

Class ListingConfig

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Represents the configuration for a listing, including elements, family details, category, and fitting types. This class provides constructors to initialize its properties either from a collection of elements or from a Data Transfer Object (DTO).

```
public class ListingConfig : ObservableObject, INotifyPropertyChanged,  
INotifyPropertyChanging
```

Inheritance

[object](#) ← [ObservableObject](#) ← ListingConfig

Implements

[INotifyPropertyChanged](#), [INotifyPropertyChanging](#)

Inherited Members

[ObservableObject.OnPropertyChanged\(PropertyChangedEventArgs\)](#) ,
[ObservableObject.OnPropertyChanging\(PropertyChangingEventArgs\)](#) ,
[ObservableObject.OnPropertyChanged\(string\)](#) , [ObservableObject.OnPropertyChanging\(string\)](#) ,
[ObservableObject SetProperty<T>\(ref T, T, string\)](#) ,
[ObservableObject SetProperty<T>\(ref T, T, IEqualityComparer<T>, string\)](#) ,
[ObservableObject SetProperty<T>\(T, T, Action<T>, string\)](#) ,
[ObservableObject SetProperty<T>\(T, T, IEqualityComparer<T>, Action<T>, string\)](#) ,
[ObservableObject SetProperty<TModel, T>\(T, T, TModel, Action<TModel, T>, string\)](#) ,
[ObservableObject SetProperty<TModel, T>\(T, T, IEqualityComparer<T>, TModel, Action<TModel, T>, string\)](#) ,
[ObservableObject SetPropertyAndNotifyOnCompletion\(ref ObservableObject.TaskNotifier, Task, string\)](#) ,

[ObservableObject SetPropertyAndNotifyOnCompletion\(ref ObservableObject.TaskNotifier, Task, Action<Task>, string\)](#) ,
[ObservableObject SetPropertyAndNotifyOnCompletion<T>\(ref ObservableObject.TaskNotifier<T>, Task<T>, string\)](#) ,
[ObservableObject SetPropertyAndNotifyOnCompletion<T>\(ref ObservableObject.TaskNotifier<T>, Task<T>, Action<Task<T>>, string\)](#) ,
[ObservableObject.PropertyChanged](#) , [ObservableObject.PropertyChanging](#) , [object.ToString\(\)](#) ,
[object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) , [object.ReferenceEquals\(object, object\)](#) ,
[object.GetHashCode\(\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Constructors

ListingConfig(ListingDto)

Represents a configuration for a listing, managing elements, family names, symbol names, and associated metadata.

```
public ListingConfig(ListingDto dto)
```

Parameters

dto [ListingDto](#)

ListingConfig(List<FamilyInstance>, StandardFittingType)

Represents the configuration of a listing, including information about the elements, fitting type, category, and suggested values.

```
public ListingConfig(List<FamilyInstance> elements, StandardFittingType standardFitting  
= StandardFittingType.None)
```

Parameters

elements [List](#)<FamilyInstance>

standardFitting [StandardFittingType](#)

Remarks

This class sets the initial configuration for a list of elements including family and symbol names, category, fitting type, and other properties based on a representative element from the provided list.

ListingConfig(string, StandardFittingType)

Represents the configuration for a listing, including the handling of family and symbol names, associated category, selected fitting type, and suggested values, derived from the specified inputs.

```
public ListingConfig(string name, StandardFittingType selectedFittingType)
```

Parameters

`name` [string](#)

`selectedFittingType` [StandardFittingType](#)

Remarks

This class processes the provided name and fitting type to initialize properties such as family name, symbol name, full name, and the category associated with the represented elements. It also manages suggested values and determines whether a valid value is selected.

Properties

CategoryName

`public string CategoryName { get; set; }`

Property Value

[string](#)

Count

`public int Count { get; set; }`

Property Value

[int](#)

Elements

Gets the collection of FamilyInstance objects associated with the current listing configuration.

`public List<FamilyInstance> Elements { get; }`

Property Value

[List](#)<[FamilyInstance](#)>

Remarks

This property holds an immutable list of family instance elements, typically used to represent a grouped set of related elements in a listing configuration. The collection is initialized during the creation of the [ListingConfig](#) and cannot be modified outside the class.

FamilyName

```
public string FamilyName { get; set; }
```

Property Value

[string](#)

HasValue

```
public bool HasValue { get; set; }
```

Property Value

[bool](#)

Name

```
public string Name { get; set; }
```

Property Value

[string](#)

SelectedFittingType

```
public StandardFittingType SelectedFittingType { get; set; }
```

Property Value

[StandardFittingType](#)

SuggestedValues

```
public List<StandardFittingType> SuggestedValues { get; set; }
```

Property Value

[List](#) <[StandardFittingType](#)>

SymbolName

```
public string SymbolName { get; set; }
```

Property Value

[string](#)

Class ListingDto

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Represents a data transfer object for a listing, including details such as family name, symbol name, category, and selected fitting type.

```
public class ListingDto
```

Inheritance

[object](#) ← ListingDto

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

ListingDto(string, string, string, string, StandardFittingType)

Initializes a new instance of the [ListingDto](#) class.

```
public ListingDto(string familyName, string symbolName, string name, string categoryName,  
StandardFittingType selectedFittingType)
```

Parameters

familyName [string](#)

The name of the Revit family.

symbolName [string](#)

The name of the family type or symbol.

name [string](#)

The display name or identifier for the listing.

`categoryName` [string](#)

The name of the Revit category.

`selectedFittingType` [StandardFittingType](#)

The selected standard fitting type.

Properties

CategoryName

Gets or sets the name of the Revit category.

```
public string CategoryName { get; set; }
```

Property Value

[string](#)

FamilyName

Gets or sets the name of the family in Revit.

```
public string FamilyName { get; set; }
```

Property Value

[string](#)

Name

Gets or sets the display name or identifier for the listing.

```
public string Name { get; set; }
```

Property Value

[string](#)

SelectedFittingType

Gets or sets the selected standard fitting type for the element.

```
public StandardFittingType SelectedFittingType { get; set; }
```

Property Value

[StandardFittingType](#)

SymbolName

Gets or sets the name of the family type or symbol.

```
public string SymbolName { get; set; }
```

Property Value

[string](#) ↗

Class ListingMapper

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Provides methods for mapping between [ListingConfig](#) and [ListingDto](#) objects.

```
public class ListingMapper
```

Inheritance

[object](#) ← ListingMapper

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains static methods to facilitate the conversion of data between the [ListingConfig](#) and [ListingDto](#) types. These methods are useful for scenarios where data needs to be transferred between different layers of an application, such as mapping configuration data to a data transfer object (DTO) for use in APIs or other external systems.

Constructors

ListingMapper()

```
public ListingMapper()
```

Methods

FromDto(ListingDto)

Converts a [ListingDto](#) object into a [ListingConfig](#) object.

```
public static ListingConfig FromDto(ListingDto dto)
```

Parameters

dto [ListingDto](#)

The source [ListingDto](#) instance to be converted.

Returns

[ListingConfig](#)

A new instance of [ListingConfig](#) containing the mapped data from the provided [ListingDto](#).

ToDto(ListingConfig)

Converts a [ListingConfig](#) object into a [ListingDto](#) object.

```
public static ListingDto ToDto(ListingConfig config)
```

Parameters

config [ListingConfig](#)

The source [ListingConfig](#) instance to be converted.

Returns

[ListingDto](#)

A new instance of [ListingDto](#) containing the mapped data from the provided [ListingConfig](#).

Class ListingSettingsHelper

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Provides helper methods for working with listing settings, including retrieval of [ListingDto](#) objects based on family and type information.

```
public static class ListingSettingsHelper
```

Inheritance

[object](#) ← ListingSettingsHelper

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetSelectedListingDto(string)

Retrieves the [ListingDto](#) that matches the specified family name and type from the user listing settings.

```
public static ListingDto? GetSelectedListingDto(string familyNameAndType)
```

Parameters

familyNameAndType [string](#)

The combined family name and type to search for.

Returns

[ListingDto](#)

The [ListingDto](#) that matches the specified **familyNameAndType**, or **null** if no match is found or if the user listing settings could not be loaded.

Class MicroBimListingRecommendationDto

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Represents a Data Transfer Object (DTO) used for providing recommendations specific to Micro BIM listings.

```
public class MicroBimListingRecommendationDto
```

Inheritance

[object](#) ← MicroBimListingRecommendationDto

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

MicroBimListingRecommendationDto()

```
public MicroBimListingRecommendationDto()
```

Properties

Name

Gets or sets the name, which must follow the format "FamilyName-SymbolName".

```
public string Name { get; set; }
```

Property Value

[string](#)

SuggestedType

Represents the suggested fitting type for a listing recommendation. This property must follow the format "FamilyName-SymbolName".

```
public StandardFittingType SuggestedType { get; set; }
```

Property Value

[StandardFittingType](#)

Class StandardFittingGroups

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Provides predefined groupings of standard fitting types for different fitting categories.

```
public static class StandardFittingGroups
```

Inheritance

[object](#) ← StandardFittingGroups

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

ElbowFittings

Gets a read-only collection of elbow-type fittings, including threaded, grooved, and embedded coupling variants.

```
public static readonly IReadOnlyList<StandardFittingType> ElbowFittings
```

Field Value

[IReadOnlyList](#)<[StandardFittingType](#)>

RemainingFittings

Gets a read-only collection of miscellaneous fittings, including couplings, caps, reducers, and general-purpose fittings.

```
public static readonly IReadOnlyList<StandardFittingType> RemainingFittings
```

Field Value

[IReadOnlyList](#) <[StandardFittingType](#)>

SpudFittings

Gets a read-only collection of spud fittings, including mechanical tees, outlets, and branch connections.

```
public static readonly IReadOnlyList<StandardFittingType> SpudFittings
```

Field Value

[IReadOnlyList](#) <[StandardFittingType](#)>

TeeFittings

Gets a read-only collection of tee and cross fittings, including threaded, grooved, and embedded coupling variants.

```
public static readonly IReadOnlyList<StandardFittingType> TeeFittings
```

Field Value

[IReadOnlyList](#) <[StandardFittingType](#)>

Enum StandardFittingType

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Represents a collection of fitting types commonly utilized within piping systems, categorized by different connection methods such as threaded, grooved, embedded couplings, integrated systems (IGS), flanged connections, and more.

```
[TypeConverter(typeof(EnumDescriptionTypeConverter))]  
public enum StandardFittingType
```

Fields

BlankEnd = 38

Represents a fitting type that is identified as a blank end.

Bush = 10

Represents the "Bush" fitting type in the StandardFittingType enumeration.

CrossEmbeddedCoupling = 34

Represents a cross fitting type that includes an embedded coupling. This fitting type is typically used in plumbing or piping systems where a cross layout, integrated with an embedded coupling, is required to connect multiple pipes or components.

ElbowWithEmbeddedCoupling = 3

Represents a type of fitting defined as "Elbow with Embedded Coupling." This fitting combines an elbow and a coupling into a single embedded component, providing a seamless transition and integrated functionality within piping systems.

FlangedFittingGeneral = 57

Represents a general type of flanged fitting in the enumeration of standard fitting types. This member is used to categorize fittings that utilize a flange connection, typically offering a secure and durable method of joining pipes or other components.

FullSocket = 12

Represents a full socket fitting type in the [StandardFittingType](#) enumeration. A full socket is typically used to provide a secure and complete connection in piping systems, allowing joining of components with an extended and enclosed fitting interface.

GRVFlangedFittingGeneral = 59

Represents a grooved flanged fitting general type in the [StandardFittingType](#) enumeration.

GRVTRDFittingGeneral = 49

Represents a grooved fitting of the TRD (Threaded Rotational Design) type within the StandardFittingType enumeration. This type is used to categorize general-purpose grooved TRD fittings.

GroovedBranchOletGOLBO = 6

Represents a grooved branch olet fitting, identified with the abbreviation GOL BO. This type of fitting is commonly used in piping systems to provide a branch connection with grooved ends for easy installation and alignment.

GroovedCap = 41

Represents a grooved cap type fitting in the context of standard fitting types. Used for applications requiring a grooved cap connection.

GroovedCoupling = 14

Represents the Grooved Coupling fitting type in the StandardFittingType enumeration. The Grooved Coupling is a standard fitting type used in piping systems. It utilizes a grooved design to enable secure and efficient assembly of piping connections, ensuring structural integrity and ease of installation.

GroovedCross = 9

Represents a grooved cross fitting type commonly used in piping systems. This fitting is designed with grooves that enable secure coupling and assembly within grooved pipe systems. It typically serves as a four-way connection point for pipes in a cross configuration, ensuring efficient fluid distribution.

GroovedElbow = 44

Represents a grooved elbow fitting type within the StandardFittingType enumeration. A grooved elbow is typically used in piping systems to change the direction of flow while maintaining a grooved connection for easy assembly and disassembly of components.

GroovedFittingGeneral = 46

Represents a general fitting type for grooved connections. This enum member is used to identify standard fittings that align with the classification of grooved fittings without specifying a more precise category.

GroovedMechanicalCross = 18

Represents a grooved mechanical cross fitting type, typically used in piping systems. This fitting allows four pipes to be joined at right angles to one another, facilitating mechanical joint installations with grooved connections.

GroovedMechanicalTee = 16

Represents a grooved mechanical tee fitting type, used in piping systems.

GroovedReducer = 42

Represents a grooved reducer fitting type within the [StandardFittingType](#) enumeration. A grooved reducer is a type of pipe fitting used to connect two pipes of different diameters while employing a grooved connection mechanism.

GroovedTee = 45

Represents a grooved tee fitting type. This fitting is characterized by its grooved ends and branch connections, commonly used for mechanical pipe joining systems.

HalfSocket = 11

Represents a standard fitting type "Half Socket". This enum value is used to represent a half socket fitting in various configurations within the system. It is identified by the enum value of 11 and has a display name of "Half Socket".

HexNipple = 13

Represents a hex nipple fitting type in the [StandardFittingType](#) enumeration. A hex nipple is a threaded fitting with hexagonal sides, designed for connecting two pipes or fittings. It is commonly used in piping systems to create secure and leak-proof connections.

IGSCap = 24

Represents an IGS-specific cap fitting type in the standard fitting type enumeration. This fitting is used to seal the end of a pipe or other component in a system that uses IGS (Integrated Grooved System) fittings.

IGSCoupling = 22

Represents the "IGS Coupling" fitting type in the StandardFittingType enumeration. This fitting type is part of the Integrated Grooved System (IGS), designed to provide secure connections in piping systems using the coupling mechanism.

IGSElbowWithEmbeddedCoupling = 20

Represents an IGS elbow fitting that includes an embedded coupling. This type of fitting is commonly used in piping systems to connect two pipe segments at an angle while providing an integrated coupling for secure and efficient connections.

IGSEndOlet = 58

Represents a fitting type categorized as "IGS End Olet". This type is designed as part of the IGS (Integrated Grooved System) fittings and typically serves as an end connection or branch outlet in piping systems.

IGSFittingGeneral = 60

Represents a general fitting type for the IGS (International Groove System) standard. This designation is used when a specific IGS fitting does not have a more detailed classification within the enumeration.

IGSGRVFittingGeneral = 54

Represents the "IGS GRV Fitting General" type within the [StandardFittingType](#) enumeration. It is used to denote a general category of grooved fittings within the IGS system.

IGSIRFittingGeneral = 48

Represents a general fitting type for the IGS and IR classifications. This enumeration member is part of the StandardFittingType enum, used for identifying fittings that combine characteristics or applications of both IGS (Integrated Groove System) and IR (Internal Resistance).

IGSMechanicalTee = 25

Represents an IGS Mechanical Tee fitting type within the [StandardFittingType](#) enumeration. An IGS Mechanical Tee is a type of fitting used in piping systems that typically allows for the branching of a pipeline while maintaining a mechanical connection.

IGSOlet = 23

Represents the IGS Olet fitting type in the [StandardFittingType](#) enumeration. This type is used for fittings designed to connect or branch pipes within the IGS (Integrated Grooved System) category.

IGSReducer = 27

Represents the IGS Reducer fitting type in the [StandardFittingType](#) enumeration. This fitting type is specific to IGS (Integrated Grooved System) and is used when a reducer is required to transition between pipes of different diameters in a grooved piping system.

IGSTRDFittingGeneral = 52

Represents the general fitting type for IGS threaded connections. This enum member is used to categorize fittings with threaded specifications under the IGS (Integrated Grooved System) standards.

IGSTeeEmbeddedCoupling = 21

Represents a fitting type categorized as IGS Tee with Embedded Coupling. This fitting type is typically used in piping or plumbing systems where an IGS-standard tee fitting incorporates an embedded coupling for streamlined and integrated connections.

IRCap = 33

Represents a standard fitting type classified as "IR Cap".

IRCoupling = 29

Represents the IR Coupling fitting type used in piping configurations. Corresponds to the fitting type with the designation "IR Coupling". Identified by its unique enum value within the StandardFittingType enumeration.

IРЕlbowEmbeddedCoupling = 30

Represents an IR (Integrated Rolled) elbow fitting with an embedded coupling. This type of fitting is designed to connect two pipes at an angle, while integrating a coupling within the fitting itself to facilitate secure and efficient connections.

IRGroovedEndOlet = 28

Represents an IR Grooved End Olet fitting type. This fitting is typically used in piping systems where grooved end connections are required to facilitate assembly without welding.

IRRReducer = 32

Represents a specific type of fitting known as "IR Reducer," which is part of the "IR" (Integral Reducer) grouping within the available standard fitting types. This type is typically used to connect pipes of different diameters while adhering to the specifications of the "IR" fitting standard.

IRTeeEmbeddedCoupling = 31

Represents a type of fitting identified as "IR Tee with Embedded Coupling". This fitting type is typically used for connection systems where a Tee shape with an integrated coupling mechanism is required for industrial or plumbing applications under the IR (InfraRed) fitting category.

MechTee922TRD = 55

Represents the "Mechanical Tee 922 TRD" fitting type in the [StandardFittingType](#) enumeration. This fitting type typically refers to a specific threaded mechanical tee designed for use in piping systems.

ModelingHelperNonConnector = 43

Represents a placeholder or helper fitting type that is not connected to any actual model or component. It can be used as a utility within modeling processes where a non-functional connector type is needed.

NewMapping = 36

Represents a new mapping type of fitting in the [StandardFittingType](#) enum.

None = 50

Represents an unspecified or default fitting type in the [StandardFittingType](#) enumeration. This value is used when no specific fitting type is applicable or has not been determined.

PVCfittingGeneralPlainEnd = 56

Represents a general-purpose PVC fitting with a plain end.

PipeOletTap = 5

Represents the "Pipe Olet Tap" type in the [StandardFittingType](#) enumeration. This fitting is typically used for branching off the main pipe, allowing for the connection of smaller pipes or outlets.

Plug = 37

Represents a plug fitting type. This fitting is typically used to seal or close the end of a pipe or fitting, preventing fluid or gas flow.

PlugConnectedAfterFullSocket = 35

Represents a standard fitting type where a plug is connected after the application of a full socket.

PlugConnectedAfterHalfSocket = 7

Represents a plug that is connected after a half socket fitting. This type is typically used in pipeline or plumbing systems to seal or terminate a connection while attached to a half socket configuration.

TeeWithEmbeddedCoupling = 4

Represents a tee fitting that includes an embedded coupling. This fitting type combines the functionality of a tee and a coupling, offering a streamlined design for specific pipe connection scenarios.

ThreadedCap = 51

Represents a threaded cap fitting type.

ThreadedCouplingUS = 15

Represents a threaded coupling fitting specific to U.S. standards.

ThreadedCross = 8

Represents a fitting type classified as "Threaded Cross". This fitting type is designed with threaded connections, allowing for a cross-shaped configuration that provides four-way pipe connection points.

ThreadedElbow = 1

Represents a threaded elbow fitting type within the standard fitting category. Threaded elbow fittings are designed to join two pipes at an angle, typically 90 or 45 degrees, and utilize threading for connection.

ThreadedFittingGeneral = 47

Represents a general threaded fitting type. It is a category within the [StandardFittingType](#) enumeration that serves as a generic descriptor for threaded fitting components where no specific subtype is identified or required.

ThreadedMechanicalCross = 19

Specifies a fitting type that represents a threaded mechanical cross.

ThreadedMechanicalTee = 17

Represents a threaded mechanical tee fitting type within the [StandardFittingType](#) enumeration. The ThreadedMechanicalTee is a type of pipe fitting used to connect branches of piping systems. It features threaded connections for secure assembly in mechanical piping configurations.

ThreadedTee = 2

Represents a type of standard fitting known as "Threaded Tee." This fitting features a T-shaped design with threaded connections at all three connection points, commonly used in piping systems for branching a flow into two lines or combining two flows into one.

WGRVFittingGeneral = 53

Represents a welded grooved fitting general type in the [StandardFittingType](#) enumeration.

WeldedEndFittingGeneral = 40

Represents a generalized welded end fitting type. This enumeration member is used to categorize fittings that utilize welded connections for establishing a secure link between piping systems and components.

WeldedGroovedPieceIR = 39

Represents a welded fitting type with grooved connections for the IR (In-Room) standard. This enum member is part of the [StandardFittingType](#) enumeration and is commonly used for creating or identifying welded fittings with grooved design utilized in IR-specific applications or configurations in mechanical systems.

Class ValueToStandardTypeDto

Namespace: [MB.Common.Settings.ListingSettings](#)

Assembly: MB.Common.dll

Represents a Data Transfer Object (DTO) that associates a specific value with a standard fitting type.

```
public class ValueToStandardTypeDto
```

Inheritance

[object](#) ← ValueToStandardTypeDto

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

ValueToStandardTypeDto()

```
public ValueToStandardTypeDto()
```

Properties

SuggestedType

Gets or sets the standard type associated with the value to standard type mapping.

```
public StandardFittingType SuggestedType { get; set; }
```

Property Value

[StandardFittingType](#)

Value

Gets or sets the value associated with the mapping to a standard fitting type.

```
public string Value { get; set; }
```

Property Value

[string](#) ↗

Namespace MB.Common.SharedParameters

Classes

[ElementExtensions](#)

Provides extension methods for working with Revit Element objects.

[SharedParameterExtensions](#)

Provides extension methods for the [ToolsSharedParameter](#) class.

Enums

[SharedParameterType](#)

Represents the types of shared parameters that can be used in Revit.

[ToolsSharedParameter](#)

Defines shared parameters for use within Revit, including metadata such as GUIDs, descriptions, parameter types, and applicable categories.

Class ElementExtensions

Namespace: [MB.Common.SharedParameters](#)

Assembly: MB.Common.dll

Provides extension methods for working with Revit Element objects.

```
public static class ElementExtensions
```

Inheritance

[object](#) ← ElementExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

MbGetParameter(Element, ToolsSharedParameter)

Retrieves a Revit Autodesk.Revit.DB.Parameter associated with the specified shared parameter from the given Element.

```
public static Parameter MbGetParameter(this Element element, ToolsSharedParameter  
sharedParameter)
```

Parameters

element Element

The Revit Element to retrieve the parameter from.

sharedParameter [ToolsSharedParameter](#)

The [ToolsSharedParameter](#) to retrieve.

Returns

Parameter

The Autodesk.Revit.DB.Parameter object associated with the specified shared parameter. Returns `null` if the parameter is not found.

MbSetParameter<T>(Element, ToolsSharedParameter, T)

Sets the value of a Revit Autodesk.Revit.DB.Parameter associated with a specified shared parameter.

```
public static void MbSetParameter<T>(this Element element, ToolsSharedParameter  
sharedParameter, T value)
```

Parameters

element Element

The Revit Element to set the parameter for.

sharedParameter [ToolsSharedParameter](#)

The [ToolsSharedParameter](#) whose value is to be set.

value T

The value to assign to the parameter.

Type Parameters

T

The type of the value to set (e.g., int, double, string, ElementId).

Exceptions

ArgumentException

Thrown if the parameter value type is unsupported or the parameter cannot be set with the specified type.

Class SharedParameterExtensions

Namespace: [MB.Common.SharedParameters](#)

Assembly: MB.Common.dll

Provides extension methods for the [ToolsSharedParameter](#) class.

```
public static class SharedParameterExtensions
```

Inheritance

[object](#) ← SharedParameterExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetCreationOptions(ToolsSharedParameter)

Creates an instance of ExternalDefinitionCreationOptions for a [ToolsSharedParameter](#).

```
public static ExternalDefinitionCreationOptions GetCreationOptions(this  
ToolsSharedParameter sharedParameter)
```

Parameters

sharedParameter [ToolsSharedParameter](#)

The shared parameter.

Returns

ExternalDefinitionCreationOptions

An ExternalDefinitionCreationOptions instance.

GetDisplayName(ToolsSharedParameter)

Retrieves the display name of a [ToolsSharedParameter](#).

```
public static string GetDisplayName(this ToolsSharedParameter sharedParameter)
```

Parameters

sharedParameter [ToolsSharedParameter](#)

The shared parameter.

Returns

[string](#)

The display name of the shared parameter.

GetGuid(ToolsSharedParameter)

Retrieves the GUID associated with a [ToolsSharedParameter](#).

```
public static string GetGuid(this ToolsSharedParameter sharedParameter)
```

Parameters

sharedParameter [ToolsSharedParameter](#)

The shared parameter.

Returns

[string](#)

The GUID of the shared parameter.

GetIncludedCategories(ToolsSharedParameter)

Retrieves the list of categories included in a [ToolsSharedParameter](#).

```
public static List<BuiltInCategory> GetIncludedCategories(this  
ToolsSharedParameter sharedParameter)
```

Parameters

sharedParameter [ToolsSharedParameter](#)

The shared parameter.

Returns

[List](#) <BuiltInCategory>

A list of BuiltInCategory values.

GetSharedParameterType(ToolsSharedParameter)

Retrieves the type of [ToolsSharedParameter](#).

```
public static SharedParameterType GetSharedParameterType(this ToolsSharedParameter  
sharedParameter)
```

Parameters

sharedParameter [ToolsSharedParameter](#)

The shared parameter.

Returns

[SharedParameterType](#)

The [SharedParameterType](#) of the shared parameter.

Enum SharedParameterType

Namespace: [MB.Common.SharedParameters](#)

Assembly: MB.Common.dll

Represents the types of shared parameters that can be used in Revit.

```
public enum SharedParameterType
```

Fields

Area = 3

Represents an area parameter type, used for values that define area measurements.

Integer = 2

Represents an integer parameter type, used for whole number values.

Text = 1

Represents a text parameter type, used for string values.

YesOrNo = 0

Represents a Yes/No parameter type, typically used for boolean values.

Enum ToolsSharedParameter

Namespace: [MB.Common.SharedParameters](#)

Assembly: MB.Common.dll

Defines shared parameters for use within Revit, including metadata such as GUIDs, descriptions, parameter types, and applicable categories.

```
public enum ToolsSharedParameter
```

Extension Methods

[SharedParameterExtensions.GetCreationOptions\(ToolsSharedParameter\)](#) ,
[SharedParameterExtensions.GetDisplayName\(ToolsSharedParameter\)](#) ,
[SharedParameterExtensions.GetGuid\(ToolsSharedParameter\)](#) ,
[SharedParameterExtensions.GetIncludedCategories\(ToolsSharedParameter\)](#) ,
[SharedParameterExtensions.GetSharedParameterType\(ToolsSharedParameter\)](#).

Fields

[Guid("9fdf6b2a-2772-4194-969c-f46d6e6ab866")]
[SharedParameterType(SharedParameterType.Area)] [RevitCategories] ActualCoverage = 1

Represents the "MBF_ActualCoverage" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, sprinklers, and pipe accessories. It is of type [Area](#).

[Guid("282d1a77-f651-4479-b6eb-85d84361c615")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] AddFitToId = 9

Represents the "MBF_AddFitToID" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

[Guid("40221BB0-FFFE-42C6-BFF1-F1048AFA0664")]
[SharedParameterType(SharedParameterType.Integer)] [RevitCategories] Allowance = 17

Represents the "MBF_Allowance" shared parameter. This shared parameter is applicable to flex pipe curves. It is of type [Integer](#).

[Guid("6BEC8CDC-378E-4389-A7D6-EAF2493CEB9A")]
[SharedParameterType(SharedParameterType.YesNo)] [RevitCategories] CalculateSum =

Represents the "MBF_IsFitting" shared parameter. This shared parameter is used for flex pipe curves and is of type [YesOrNo](#).

```
[Guid("14fca12a-1224-41e5-a8a6-d4c0af178974")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Color = 7
```

Represents the "MBF_Color" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("27e7c7ba-40cc-4ca6-b0c3-07a8e537a3bb")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories]
DescriptionAndAbbreviationListNo = 11
```

Represents the "MBF_DescAbbrvListNo" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("2e46e681-4255-4016-9e53-722cb8aaaf32")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] DischargeDensity =
43
```

Represents the discharge density parameter used in Revit for various categories, such as pipes, fittings, and mechanical equipment. This shared parameter is identified by the GUID `2e46e681-4255-4016-9e53-722cb8aaaf32` and is categorized as text. It is applicable to multiple Revit categories, including pipe curves, pipe fittings, pipe accessories, generic models, flexible pipe curves, sprinklers, and mechanical equipment.

```
[Guid("48b9c6f5-70b6-4f7f-bd23-5ae171a78a7f")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] DischargeType =
44
```

Represents the discharge type for mechanical systems in Revit. This parameter is used to categorize and define the type of discharge in mechanical systems, such as pipes, fittings, accessories, and other related components. It is associated with multiple Revit categories, including pipes, pipe fittings, pipe accessories, generic models, flexible pipes, sprinklers, and mechanical equipment.

```
[Guid("322979ea-68ed-4725-b563-2cc023159fa9")]
[SharedParameterType(SharedParameterType.YesNo)] [RevitCategories] DoNotNumber =
42
```

Represents a shared parameter that determines whether numbering should be applied. This parameter is typically used in Revit to control whether elements such as pipes, pipe fittings, or pipe accessories are assigned numbers. It is associated with the categories `BuiltInCategory.OST_PipeCurves`, `BuiltInCategory.OST_PipeFitting`, and `BuiltInCategory.OST_PipeAccessory`.

```
[Guid("b1af6c8f-8b44-4e5d-ad1d-80deb78bc6b6")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] EndPap = 23
```

Represents the end paper (EndPap) parameter for Revit elements, typically used in piping systems. This parameter is associated with Revit categories such as pipes and pipe fittings. It is defined as a shared parameter of type [Text](#).

```
[Guid("d94545bc-4956-411d-a6bc-9ec96101d350")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories]
ExportedPackageName = 12
```

Represents the "MBF_Exported_PackageName" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("83d4381a-bfe9-450e-9364-c44036e81756")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] ExportedPdfName = 14
```

Represents the "MBF_Exported_PDFName" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("1bf7feba-7bca-40c9-8ca0-8365574c2648")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories]
FabricationGroupName = 16
```

Represents the "MBF_FabGroupName" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("15b2c379-8df6-4f2d-8499-9883e0256663")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Finish = 7
```

Represents the "MBF_Finish" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("72f35e3d-3bd7-4169-b3c0-c6485cdd39c4")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] HandTight = 10
```

Represents the "MBF_HandTight" shared parameter.This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("8495409d-c110-4685-b548-2f1440fa7307")]
[SharedParameterType(SharedParameterType.YesNo)] [RevitCategories]
IgnoreInCalculation = 3
```

Represents the "MBF_IgnoreInCalculation" shared parameter.This shared parameter is applicable to pipe fittings, sprinklers, pipe accessories, mechanical equipment, and fire alarm devices. It is of type [YesOrNo](#).

```
[Guid("e87615ee-c2b0-4f93-9194-8ffda612cdf6")]
[SharedParameterType(SharedParameterType.YesNo)] [RevitCategories]
IncludeInCalculation = 2
```

Represents the "MBF_IncludeInCalcs" shared parameter.This shared parameter is applicable to pipe fittings, sprinklers, pipe accessories, mechanical equipment, and fire alarm devices. It is of type [YesOrNo](#).

```
[Guid("997C72F0-F375-439E-9AD1-BC2570651E42")]
[SharedParameterType(SharedParameterType.YesNo)] [RevitCategories] IsFitting = 19
```

Represents the "MBF_IsFitting" shared parameter.This shared parameter is used for flex pipe curves and is of type [YesOrNo](#).

```
[Guid("b06ebb90-4f1e-4881-bfb5-fef6f7a64909")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] MinimumFlow = 5
```

Represents the "MBF_Min_Flow" shared parameter.This shared parameter is applicable to pipe fittings, sprinklers, and pipe accessories. It is of type [Text](#).

```
[Guid("467a1334-8e46-4d4d-bf22-0bd377ff6be5")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] MinimumPressure = 4
```

Represents the "MBF_Min_Pressure" shared parameter.This shared parameter is applicable to pipe fittings, sprinklers, and pipe accessories. It is of type [Text](#).

```
[Guid("c0932a83-87c2-4286-9c28-d4eb4ae03ef8")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap1 = 25
```

Represents a shared parameter type for Revit elements, specifically associated with pipe curves. This class is identified by the GUID "c0932a83-87c2-4286-9c28-d4eb4ae03ef8" and is categorized under the Revit built-in category `BuiltInCategory.OST_PipeCurves`. It is intended for use with shared parameters of type [Text](#).

```
[Guid("64f2f492-72f6-4e92-9b54-4e6bd8845275")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap2 = 27
```

Represents a shared parameter with the identifier "2_PAP" for use in Revit's pipe curves category. This parameter is associated with the `BuiltInCategory.OST_PipeCurves` category in Revit and is defined as a text-based shared parameter. It is identified by the GUID "64f2f492-72f6-4e92-9b54-4e6bd8845275".

```
[Guid("4acd2fa4-e8c4-4d00-89e6-bdeed126fb39")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap3 = 29
```

Represents a shared parameter with the identifier "3_PAP" for use in Revit's pipe curves category. This parameter is associated with the `BuiltInCategory.OST_PipeCurves` category in Revit and is defined as a text-based shared parameter. It is identified by the GUID "4acd2fa4-e8c4-4d00-89e6-bdeed126fb39".

```
[Guid("b710b589-43a3-4663-9f5d-c7c255095194")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap4 = 31
```

Represents a shared parameter type with the identifier "4_PAP" for use in Revit. This parameter is associated with the Revit category `BuiltInCategory.OST_PipeCurves` and is defined as a text-based shared parameter. It is identified by the GUID "b710b589-43a3-4663-9f5d-c7c255095194".

```
[Guid("2073ad09-f450-4369-b152-366f3c97f352")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap5 = 33
```

Represents a shared parameter with the identifier "5_PAP" for use in Revit projects. This parameter is associated with the Revit category `BuiltInCategory.OST_PipeCurves` and is defined as a text-based shared parameter. It is identified by the GUID "2073ad09-f450-4369-b152-366f3c97f352".

```
[Guid("b25b7441-fe65-4a68-b5da-0195cf452a66")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap6 = 35
```

Represents a shared parameter with the identifier "6_PAP" for use in Revit projects. This parameter is associated with the Revit category `BuiltInCategory.OST_PipeCurves` and is defined as a text-based shared parameter. It is identified by the GUID "b25b7441-fe65-4a68-b5da-0195cf452a66".

```
[Guid("38005670-ec77-4a15-a561-ff65273fc09a")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap7 = 37
```

Represents a shared parameter with the identifier "7_PAP" for use in Revit projects. This parameter is associated with the Revit category `BuiltInCategory.OST_PipeCurves` and is defined as a text-based shared parameter. It is identified by the GUID "38005670-ec77-4a15-a561-ff65273fc09a".

```
[Guid("9d447d9e-3100-45b6-9cc9-f6cbe40381ca")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap8 = 39
```

Represents a shared parameter with the identifier "8_PAP" for use in Revit projects. This parameter is associated with pipe curves in Revit and is categorized under `BuiltInCategory.OST_PipeCurves`. It is defined as a text-based shared parameter.

```
[Guid("2b164db7-983f-455e-9b0a-ba77061456d6")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Pap9 = 41
```

Represents a shared parameter with the identifier "9_PAP" for use in Revit. This parameter is associated with the Revit category `BuiltInCategory.OST_PipeCurves` and is defined as a text-based shared parameter. It is identified by the GUID "2b164db7-983f-455e-9b0a-ba77061456d6".

```
[Guid("c4347a82-7375-42aa-ad1a-96ba6212f122")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] PipeCode = 8
```

Represents the "MBF_PipeCode" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("a137e596-b255-494a-9c8a-1f32f4ec0a5f")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] PipeNoListing =
21
```

Represents a shared parameter for specifying a pipe number listing in a Revit model. This parameter is associated with Revit categories such as `BuiltInCategory.OST_PipeCurves` and `BuiltInCategory.OST_PipeFitting`. It is defined as a text-based shared parameter and is identified by the GUID "a137e596-b255-494a-9c8a-1f32f4ec0a5f".

```
[Guid("2e83bba8-8d6e-4a90-a29f-108c705a7661")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] ProtectionArea =
6
```

Represents the "MBF_ProtectionArea" shared parameter. This shared parameter is applicable to pipe fittings, sprinklers, and pipe accessories. It is of type [Text](#).

```
[Guid("5f2c6451-0d24-4421-b3f8-02386c2cd60b")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] RealGroupSize =
```

Represents the "MBF_Allowance" shared parameter. This shared parameter is applicable to flex pipe curves. It is of type [Text](#).

```
[Guid("5f2c6451-0d24-4421-b3f8-02386c2cd60b")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] RealFittingSizes =
13
```

Represents the "MBF_RealFittingSizes" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

```
[Guid("5fa85912-77b2-4d48-a7df-5e524aa45c43")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run1Dim = 24
```

Represents a shared parameter for specifying the dimension of a pipe run in Revit. This parameter is associated with the "1_RUN DIM" description and is categorized under `BuiltInCategory.OST_PipeCurves`. It is defined as a text-based shared parameter.

```
[Guid("28aba22e-1438-4608-b8ce-a85e52854267")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run2Dim = 26
```

Represents a shared parameter for specifying the 2_RUN DIM value in Revit. This parameter is associated with pipe curves in Revit and is categorized as a text parameter. It is identified by the GUID "28aba22e-1438-4608-b8ce-a85e52854267".

```
[Guid("47e8420e-dc38-47ce-9dbd-74358a69a28c")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run3Dim = 28
```

Represents a shared parameter for the "3_RUN DIM" property in Revit, associated with pipe curves. This parameter is identified by the GUID "47e8420e-dc38-47ce-9dbd-74358a69a28c" and is categorized under `BuiltInCategory.OST_PipeCurves`. It is defined as a text-based shared parameter.

```
[Guid("216fb144-f402-4d1b-b6f9-dc1f62850017")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run4Dim = 30
```

Represents a shared parameter for specifying the "4_RUN DIM" value in Revit pipe curves. This parameter is associated with the "4_RUN DIM" description and is categorized under `BuiltInCategory.OST_PipeCurves`. It is defined as a text-based shared parameter.

```
[Guid("236886e5-b9d9-4a7a-a456-27324bb33869")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run5Dim = 32
```

Represents a shared parameter for specifying the "5_RUN DIM" value in Revit. This parameter is associated with the "PipeCurves" category in Revit and is of type [Text](#). It is identified by the GUID "236886e5-b9d9-4a7a-a456-27324bb33869".

```
[Guid("5914c51d-8028-48c3-bde0-98e21dca0d67")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run6Dim = 34
```

Represents a shared parameter for specifying the "6_RUN DIM" value associated with pipe curves in Revit. This parameter is categorized under the Revit built-in category `BuiltInCategory.OST_PipeCurves` and is defined as a text-based shared parameter. It is identified by the GUID "5914c51d-8028-48c3-bde0-98e21dca0d67".

```
[Guid("fc237068-ae9a-45eb-81da-f4a3a7c00a38")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run7Dim = 36
```

Represents a shared parameter for specifying the "7_RUN DIM" value in Revit. This parameter is associated with the "PipeCurves" category in Revit and is of type [Text](#). It is identified by the GUID "fc237068-ae9a-45eb-81da-f4a3a7c00a38".

```
[Guid("62244904-01e1-45f3-a2c6-cf15ea715713")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run8Dim = 38
```

Represents a shared parameter for specifying the "8_RUN DIM" value in Revit pipe curves. This parameter is associated with the "8_RUN DIM" description and is categorized under `BuiltInCategory.OST_PipeCurves`. It is defined as a text-based shared parameter.

```
[Guid("a5f94330-0a3b-4242-91be-8a66ddc62e56")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] Run9Dim = 40
```

Represents a shared parameter for the "9_RUN DIM" dimension, associated with pipe curves in Revit. This parameter is categorized under the `BuiltInCategory.OST_PipeCurves` category and is defined as a length parameter. It is identified by the GUID "a5f94330-0a3b-4242-91be-8a66ddc62e56".

```
[Guid("ab1be1ed-1730-433c-b2c6-51edfaf84b5")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] StartPap = 22
```

Represents the "Start Pap" shared parameter, which is associated with pipe curves and pipe fittings in Revit. This parameter is categorized under `BuiltInCategory.OST_PipeCurves` and `BuiltInCategory.OST_PipeFitting`. It is defined as a text-based shared parameter and is identified by the GUID "ab1be1ed-1730-433c-b2c6-51edfaf84b5".

```
[Guid("9d698cc7-3c6d-466e-9f89-ee1baf1326a2")]
[SharedParameterType(SharedParameterType.Text)] [RevitCategories] SubType = 15
```

Represents the "MBF_Subtype" shared parameter. This shared parameter is applicable to pipe curves, pipe fittings, pipe accessories, generic models, model groups, mechanical equipment, sprinklers, fire alarm devices, and flex pipe curves. It is of type [Text](#).

Namespace MB.Common.Tools

Classes

[MbftoolExtensions](#)

Provides extension methods for the [Mbftool](#) class.

Enums

[Mbftool](#)

Enum representing various tools in the MBF (MicroBIM Fire) suite. Each tool is decorated with descriptive metadata and optional shared parameter requirements.

Enum Mbftool

Namespace: [MB.Common.Tools](#)

Assembly: MB.Common.dll

Enum representing various tools in the MBF (MicroBIM Fire) suite. Each tool is decorated with descriptive metadata and optional shared parameter requirements.

```
public enum Mbftool
```

Extension Methods

[MbftoolExtensions.GetRequiredSharedParameters\(Mbftool\)](#)

Fields

ApplyParameters = 4

Represents the Apply Parameters tool.

AssemblyManager = 2

Represents the Assembly Manager tool.

AutoSprinklerSpacing = 6

Represents the Auto Sprinkler Spacing tool.

CutLengthPipeOptimization = 3

Represents the Cut Length Pipe Optimization tool.

```
[RequiredSharedParameters(new ToolsSharedParameter[] { ToolsSharedParameter.Color,
ToolsSharedParameter.Color, ToolsSharedParameter.PipeCode,
ToolsSharedParameter.AddFitToId, ToolsSharedParameter.HandTight,
ToolsSharedParameter.DescriptionAndAbbreviationListNo,
ToolsSharedParameter.ExportedPackageName, ToolsSharedParameter.RealFittingSizes,
ToolsSharedParameter.ExportedPdfName, ToolsSharedParameter.SubType,
ToolsSharedParameter.FabricationGroupName, ToolsSharedParameter.Allowance,
ToolsSharedParameter.RealGroupSize, ToolsSharedParameter.IsFitting,
ToolsSharedParameter.CalculateSum })] Mapper = 5
```

Represents the Mapper tool, used to assign various metadata and fabrication-related properties. This tool requires several shared parameters including: [Color](#), [Finish](#), [PipeCode](#), and many others used for downstream fabrication and reporting.

```
[RequiredSharedParameters(new ToolsSharedParameter[] {  
    ToolsSharedParameter.ActualCoverage, ToolsSharedParameter.ProtectionArea })]  
SprinklerVoronoi = 1
```

Represents the Sprinkler Voronoi tool. This tool requires the [ActualCoverage](#) and [ProtectionArea](#) shared parameters.

Remarks

Tools are annotated with [DescriptionAttribute](#) for display purposes, and with [RequiredSharedParametersAttribute](#) to define necessary shared parameters.

Class MbftoolExtensions

Namespace: [MB.Common.Tools](#)

Assembly: MB.Common.dll

Provides extension methods for the [Mbftool](#) class.

```
public static class MbftoolExtensions
```

Inheritance

[object](#) ← MbftoolExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetRequiredSharedParameters(Mbftool)

Retrieves the required shared parameters associated with the specified [Mbftool](#).

```
public static ToolsSharedParameter[] GetRequiredSharedParameters(this Mbftool tool)
```

Parameters

tool [Mbftool](#)

The [Mbftool](#) instance for which the required shared parameters are retrieved.

Returns

[ToolsSharedParameter\[\]](#)

An array of [ToolsSharedParameter](#) objects if the [RequiredSharedParametersAttribute](#) is found; otherwise, an empty array.

Namespace MB.Common.Utils.Attributes

Classes

[AttributeUtils](#)

Provides utility methods for working with custom attributes in .NET.

Class AttributeUtils

Namespace: [MB.Common.Utils.Attributes](#)

Assembly: MB.Common.dll

Provides utility methods for working with custom attributes in .NET.

```
public static class AttributeUtils
```

Inheritance

[object](#) ← AttributeUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetAttribute<T>(object)

Retrieves a custom attribute of the specified type **T** applied to a given enum value or field.

```
public static T GetAttribute<T>(object value) where T : Attribute
```

Parameters

value [object](#)

The target enum value or field.

Returns

T

The attribute of type **T** if it is applied; otherwise, throws an exception.

Type Parameters

T

The type of the attribute to retrieve.

GetFieldAttribute<T, TType>(string)

Retrieves a custom attribute of the specified type **T** applied to a given field in a class or struct.

```
public static T GetFieldAttribute<T, TType>(string fieldName) where T : Attribute
```

Parameters

fieldName [string](#)

The name of the field in the class or struct.

Returns

T

The attribute of type **T** if it is applied; otherwise, throws an exception.

Type Parameters

T

The type of the attribute to retrieve.

TType

The type of the target class or struct.

TryGetAttribute<T>(object, out T)

Attempts to retrieve a custom attribute of the specified type **T** applied to a given enum value or field without throwing an exception if it is not found.

```
public static bool TryGetAttribute<T>(object value, out T attribute) where T : Attribute
```

Parameters

value [object](#)

The target enum value or field.

attribute T

When this method returns, contains the attribute of type `T` if found; otherwise, `null`.

Returns

`bool` ↗

True if the attribute is found; otherwise, false.

Type Parameters

`T`

The type of the attribute to retrieve.

Namespace MB.Common.Utils.Handlers

Classes

[MbHandlers](#)

Provides static access to Revit external event handlers used across the application.

Class MbHandlers

Namespace: [MB.Common.Utils.Handlers](#)

Assembly: MB.Common.dll

Provides static access to Revit external event handlers used across the application.

```
public static class MbHandlers
```

Inheritance

[object](#) ← MbHandlers

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This utility class simplifies the management of Revit's Nice3point.Revit.Toolkit.External.Handlers.Action EventHandler and Nice3point.Revit.Toolkit.External.Handlers.AsyncEventHandler instances, allowing them to be globally registered and reused.

Properties

AsyncExternalEventHandler

Gets or sets the asynchronous external event handler for executing asynchronous Revit commands.

```
public static AsyncEventHandler AsyncExternalEventHandler { get; set; }
```

Property Value

AsyncEventHandler

ExternalEventHandler

Gets or sets the synchronous external event handler for executing Revit commands.

```
public static ActionEventHandler ExternalEventHandler { get; set; }
```

Property Value

ActionEventHandler

Methods

RegisterHandlers()

Registers and initializes the external event handlers used by the application. Call this method during application startup or initialization.

```
public static void RegisterHandlers()
```

Namespace MB.Common.Utils.Image

Classes

[ImageUtils](#)

Provides utility functions for working with images, such as resizing with high-quality settings.

Class ImageUtils

Namespace: [MB.Common.Utils.Image](#)

Assembly: MB.Common.dll

Provides utility functions for working with images, such as resizing with high-quality settings.

```
public static class ImageUtils
```

Inheritance

[object](#) ← ImageUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

ResizeImage(Image, int, int)

Resizes an image to the specified dimensions while preserving visual quality using advanced graphics settings.

```
public static Bitmap ResizeImage(Image image, int width, int height)
```

Parameters

image [Image](#)

The source [Image](#) to be resized.

width [int](#)

The target width of the resized image.

height [int](#)

The target height of the resized image.

Returns

[Bitmap](#)

A new [Bitmap](#) instance containing the resized image.

Namespace MB.Common.Utils.Loaders

Classes

[MbResourceLoader](#)

Provides utility methods for working with embedded resources, including loading JSON content and extracting files.

Class MbResourceLoader

Namespace: [MB.Common.Utils.Loaders](#)

Assembly: MB.Common.dll

Provides utility methods for working with embedded resources, including loading JSON content and extracting files.

```
public static class MbResourceLoader
```

Inheritance

[object](#) ← MbResourceLoader

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

EnsureFileFromEmbeddedResource(string, string)

Ensures that a file exists at the specified path. If it does not, the method creates it using the content from an embedded resource.

```
public static MbResult<bool> EnsureFileFromEmbeddedResource(string outputPath,  
    string embeddedResourceName)
```

Parameters

outputPath [string](#)

The full path where the file should be created if it doesn't exist.

embeddedResourceName [string](#)

The full name of the embedded resource (e.g., "Namespace.Resources.Default.json").

Returns

[MbResult<bool>](#)

An [MbResult<T>](#) indicating the outcome:

- `Success = true` — The file already exists or was created successfully from the embedded resource.
- `Success = false` — The resource was not found or an error occurred during file creation. The `ErrorMessage` will describe the issue.

Remarks

This method can be used to seed configuration files or default templates on first run of the application. It supports nested directory creation and uses the currently executing assembly to locate the resource.

LoadEmbeddedJsonAsync<T>(string, Assembly)

Loads a JSON list of objects from an embedded resource using Newtonsoft.Json.

```
public static Task<List<T>> LoadEmbeddedJsonAsync<T>(string resourceName,  
Assembly assembly)
```

Parameters

`resourceFileName` [string](#)

The name of the embedded resource file.

`assembly` [Assembly](#)

The assembly containing the embedded resource.

Returns

[Task](#)<[List](#)<T>>

A list of deserialized objects, or an empty list on failure.

Type Parameters

T

The type of objects in the JSON list.

Namespace MB.Common.Utils.Result

Classes

[MbResult<T>](#)

Represents the result of an operation, encapsulating the success status, value, and error message.

Class MbResult<T>

Namespace: [MB.Common.Utils.Result](#)

Assembly: MB.Common.dll

Represents the result of an operation, encapsulating the success status, value, and error message.

```
public class MbResult<T>
```

Type Parameters

T

The type of the result value.

Inheritance

[object](#) ← MbResult<T>

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Properties

ErrorMessage

Gets the error message if the operation failed.

```
public string ErrorMessage { get; }
```

Property Value

[string](#)

IsSuccess

Gets a value indicating whether the operation was successful.

```
public bool IsSuccess { get; }
```

Property Value

[bool](#)

Value

Gets the value of the result if the operation was successful.

```
public T Value { get; }
```

Property Value

T

Methods

Failure(string)

Creates a failed result containing the specified error message.

```
public static MbResult<T> Failure(string errorMessage)
```

Parameters

errorMessage [string](#)

The error message.

Returns

[MbResult](#)<T>

A failed [MbResult](#)<T>.

Success(T)

Creates a successful result containing the specified value.

```
public static MbResult<T> Success(T value)
```

Parameters

value T

The result value.

Returns

[MbResult<T>](#)

A successful [MbResult<T>](#).

Namespace MB.Common.ViewLoader

Classes

[IsolatedViewLoader](#)

Provides extension methods for loading XAML views manually and in isolation from a URI. This is used as a workaround for known issues in some WPF/Revit XAML loading contexts.

Class IsolatedViewLoader

Namespace: [MB.Common.ViewLoader](#)

Assembly: MB.Common.dll

Provides extension methods for loading XAML views manually and in isolation from a URI. This is used as a workaround for known issues in some WPF/Revit XAML loading contexts.

```
public static class IsolatedViewLoader
```

Inheritance

[object](#) ← IsolatedViewLoader

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

LoadViewFromUri(FrameworkElement, string)

Loads a XAML view from a given base URI into a [FrameworkElement](#). Uses reflection to bypass internal WPF methods and load XAML manually.

```
public static void LoadViewFromUri(this FrameworkElement view, string baseUri)
```

Parameters

view [FrameworkElement](#)

The view instance into which the XAML will be loaded.

baseUri [string](#)

The relative URI to the XAML file (e.g. "/AssemblyName;component/ViewFolder/View.xaml").

LoadView<T>(T)

Loads the corresponding XAML view based on the type of the view instance. Infers the URI automatically from the view's type and namespace.

```
public static void LoadView<T>(this T view) where T : FrameworkElement
```

Parameters

view **T**

The view instance to load.

Type Parameters

T

The type of the view, must inherit from [FrameworkElement](#).

Namespace MBF.Revit.Creation.Extensions

Classes

[DocumentExtensions](#)

Provides extension methods for working with Revit documents, specifically for managing linked Revit models.

Class DocumentExtensions

Namespace: [MBF.Revit.Creation.Extensions](#)

Assembly: MBF.Revit.Creation.dll

Provides extension methods for working with Revit documents, specifically for managing linked Revit models.

```
[LogAspect]  
public static class DocumentExtensions
```

Inheritance

[object](#) ← DocumentExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes methods to retrieve and manipulate linked Revit model instances within a document. These methods are designed to simplify common tasks related to linked models, such as retrieving all valid linked models or ensuring that linked models are set to be room bounding.

Methods

GetAllLinkedRevitModels(Document)

Retrieves all valid linked Revit model instances in the document.

```
public static List<RevitLinkInstance> GetAllLinkedRevitModels(this Document doc)
```

Parameters

doc Document

The Revit document to search in.

Returns

List <RevitLinkInstance>

A list of Autodesk.Revit.DB.RevitLinkInstance objects representing valid linked models.

MakeLinkedModelsRoomBounding(Document)

Ensures that all linked Revit models in the document are set to be room bounding.

```
public static void MakeLinkedModelsRoomBounding(this Document doc)
```

Parameters

doc Document

The Revit document in which to update linked model settings.

Namespace MBF.Revit.Data.Extensions

Classes

[DocumentExtensions](#)

Provides extension methods for working with Revit documents, enabling operations such as retrieving elements, creating views, and managing linked documents.

[PipeExtensions](#)

Provides extension methods for working with Autodesk.Revit.DB.Plumbing.Pipe objects in Revit.

[SelectionExtensions](#)

Provides extension methods for retrieving selected elements of specific types from a UIDocument.

[SpaceExtensions](#)

Provides extension methods for working with Autodesk.Revit.DB.Mechanical.Space objects, including retrieving boundary segments and validating the space.

[ViewExtensions](#)

Provides extension methods for working with Revit views.

Class DocumentExtensions

Namespace: [MBF.Revit.Data.Extensions](#)

Assembly: MBF.Revit.Data.dll

Provides extension methods for working with Revit documents, enabling operations such as retrieving elements, creating views, and managing linked documents.

```
[LogAspect]  
public static class DocumentExtensions
```

Inheritance

[object](#) ← DocumentExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This static class contains a variety of helper methods designed to simplify common tasks when working with Autodesk Revit's API. These methods include retrieving specific types of elements (e.g., family types, levels, rebar shapes), creating and managing views, and handling linked documents.

Each method in this class is implemented as an extension method for the Autodesk.Revit.DB.Document class, allowing them to be called directly on instances of Autodesk.Revit.DB.Document.

The methods in this class return results wrapped in [MbResult<T>](#) objects, which encapsulate both the operation's outcome and any error messages, ensuring robust error handling.

Methods

CreateAndPlaceColumnAtPoint(Document, XYZ, FamilySymbol, Level, Level)

Creates and places a column at a specified point in the Revit document.

```
public static MbResult<FamilyInstance> CreateAndPlaceColumnAtPoint(this Document doc, XYZ  
point, FamilySymbol columnType, Level baseLevel, Level topLevel)
```

Parameters

doc Document

The Revit document where the column will be placed.

point XYZ

The XYZ point where the column will be placed.

columnType FamilySymbol

The FamilySymbol representing the column type.

baseLevel Level

The base level of the column.

topLevel Level

The top level of the column.

Returns

[MbResult](#)<FamilyInstance>

An [MbResult<T>](#) containing:

- The created FamilyInstance if successful.
- An error message if any input is invalid or column creation fails.

GetAllRevitDocuments(Document)

Retrieves the base document and all linked Revit documents.

```
public static List<Document> GetAllRevitDocuments(this Document doc)
```

Parameters

doc Document

The base Revit document.

Returns

[List](#) <Document>

A list of Revit Autodesk.Revit.DB.Document instances including the base and all linked documents.

GetFamilyTypesByCategoryOrderedByName(Document, BuiltInCategory)

Retrieves all family types in the specified category from the given Revit document, ordered by their names.

```
public static MbResult<ObservableCollection<FamilySymbol>>
GetFamilyTypesByCategoryOrderedByName(this Document doc, BuiltInCategory category)
```

Parameters

doc Document

The Revit document from which to retrieve the family types. Cannot be [null](#).

category BuiltInCategory

The built-in category to filter the family types.

Returns

[MbResult](#)<[ObservableCollection](#)<FamilySymbol>>

A result object containing an observable collection of Autodesk.Revit.DB.FamilySymbol objects ordered by name if the operation succeeds, or an error message in bullet points if the operation fails.

Remarks

This method uses a filtered element collector to retrieve family types of the specified category and orders them alphabetically by their names.

If an error occurs during the operation, the result will contain a failure message with details in bullet points:

- The Revit document cannot be null.
- An error occurred: [error message]

GetLevelsOrderedByProperty<TKey>(Document, Func<Level, TKey>, bool)

Retrieves all levels from the specified Revit document as an ObservableCollection, ordered dynamically by a specified property.

```
public static MbResult<ObservableCollection<Level>> GetLevelsOrderedByProperty<TKey>(this Document doc, Func<Level, TKey> keySelector, bool ascending = true)
```

Parameters

doc Document

The Revit document to search for levels.

keySelector [Func](#)<Level, TKey>

A function to extract a key from a Level for ordering.

ascending [bool](#)

If true, orders levels in ascending order; otherwise, descending.

Returns

[MbResult](#)<ObservableCollection<Level>>

An [MbResult](#)<T> containing:

- An ObservableCollection of Level objects if successful.
- An error message if the document or keySelector is null.

Type Parameters

TKey

The type of the property used for ordering.

GetLinkedDocumentsOnly(Document)

Retrieves only the linked Revit documents associated with the given base document.

```
public static List<Document> GetLinkedDocumentsOnly(this Document doc)
```

Parameters

doc Document

The base Revit document.

Returns

[List](#) <Document>

A list of linked Autodesk.Revit.DB.Document instances.

GetRebarBarTypes(Document)

Retrieves all rebar bar types from the specified Revit document as an ObservableCollection.

```
public static MbResult<ObservableCollection<RebarBarType>> GetRebarBarTypes(this
    Document doc)
```

Parameters

doc Document

The Revit document to retrieve rebar bar types from.

Returns

[MbResult](#)<[ObservableCollection](#)<RebarBarType>>

An [MbResult<T>](#) containing:

- An ObservableCollection of RebarBarType objects if successful.
- An error message if the document is null.

GetRebarShapes(Document)

Retrieves all rebar shapes from the specified Revit document.

```
public static MbResult<List<RebarShape>> GetRebarShapes(this Document doc)
```

Parameters

doc Document

The Revit document to retrieve rebar shapes from.

Returns

[MbResult<List<RebarShape>>](#)

An [MbResult<T>](#) containing:

- A list of RebarShape objects if successful.
- An error message if the document is null.

SearchOrCreate3DView(Document, string, bool)

Searches for a 3D view with the specified name. If it exists, returns it. Optionally, creates a new 3D view if specified.

```
public static MbResult<View3D> SearchOrCreate3DView(this Document doc, string viewName, bool  
createView = false)
```

Parameters

doc Document

The Revit document to search or create the 3D view in.

viewName [string](#)

The name of the 3D view to search for or create.

createView [bool](#)

If [true](#), creates a new 3D view if one does not exist.

Returns

[MbResult<View3D>](#)

An [MbResult<T>](#) containing:

- The existing or newly created Autodesk.Revit.DB.View3D object if successful.
- An error message if the document is null, the view name is invalid, or creation fails.

Class PipeExtensions

Namespace: [MBF.Revit.Data.Extensions](#)

Assembly: MBF.Revit.Data.dll

Provides extension methods for working with Autodesk.Revit.DB.Plumbing.Pipe objects in Revit.

```
[LogAspect]  
public static class PipeExtensions
```

Inheritance

[object](#) ← PipeExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes utility methods for retrieving geometric and system-related information about pipes, such as endpoints, connectors, curves, and associated piping system types. Each method returns an [MbResult<T>](#) to encapsulate the result or an error message, ensuring robust error handling for common issues like null inputs or invalid pipe states.

Methods

GetEndPoints(Pipe)

Retrieves the endpoints of a pipe as a list of XYZ points.

```
public static MbResult<List<XYZ>> GetEndPoints(this Pipe pipe)
```

Parameters

pipe Pipe

The pipe to get the endpoints for.

Returns

[MbResult<List<XYZ>>](#)

An [MbResult<T>](#) containing the list of endpoints or an error message. Possible error messages:

- "The pipe cannot be null." - Returned if the input pipe is null.
- "The pipe does not have a valid LocationCurve." - Returned if the pipe's location is not a valid curve.

GetNearestEndPoints(Pipe, XYZ)

Finds the nearest and farthest endpoints of a pipe relative to a specified point.

```
public static MbResult<List<XYZ>> GetNearestEndPoints(this Pipe pipe, XYZ point)
```

Parameters

pipe Pipe

The pipe to find endpoints for.

point XYZ

The reference point for distance comparison.

Returns

[MbResult<List<XYZ>>](#)

An [MbResult<T>](#) containing a list of nearest and farthest endpoints or an error message. Possible error messages:

- "The pipe cannot be null." - Returned if the input pipe is null.
- "The reference point cannot be null." - Returned if the input point is null.
- "The pipe does not have a valid LocationCurve." - Returned if the pipe's location is not a valid curve.

GetNearestOneSideConnector(Pipe, XYZ)

Finds the nearest one-side connector on a pipe to a specified point.

```
public static MbResult<Connector> GetNearestOneSideConnector(this Pipe pipe, XYZ point)
```

Parameters

pipe Pipe

The pipe to search for connectors.

point XYZ

The point to measure the distance from.

Returns

[MbResult<Connector>](#)

An [MbResult<T>](#) containing the nearest connector or an error message. Possible error messages:

- "The pipe cannot be null." - Returned if the input pipe is null.
- "The reference point cannot be null." - Returned if the input point is null.
- "No connectors found on the pipe." - Returned if the pipe does not have any valid connectors.
- "An error occurred while finding the nearest connector: {ErrorMessage}" - Returned if an unexpected exception occurs.

GetPipeCurve(Pipe)

Gets the curve representing the pipe's geometry.

```
public static MbResult<Curve> GetPipeCurve(this Pipe pipe)
```

Parameters

pipe Pipe

The pipe to retrieve the curve from.

Returns

[MbResult<Curve>](#)

An [MbResult<T>](#) containing the curve or an error message. Possible error messages:

- "The pipe cannot be null." - Returned if the input pipe is null.
- "The pipe does not have a valid LocationCurve." - Returned if the pipe's location is not a valid curve.

GetPipingSystemType(Pipe, Document)

Gets the piping system type associated with a pipe.

```
public static MbResult<PipingSystemType> GetPipingSystemType(this Pipe pipe,  
Document document)
```

Parameters

pipe Pipe

The pipe to retrieve the piping system type for.

document Document

The Revit document containing the pipe.

Returns

[MbResult<PipingSystemType>](#)

An [MbResult<T>](#) containing the piping system type or an error message. Possible error messages:

- "The pipe cannot be null." - Returned if the input pipe is null.
- "The document cannot be null." - Returned if the input document is null.
- "The pipe is not associated with a piping system." - Returned if the pipe is not part of a piping system.
- "Failed to retrieve the piping system type." - Returned if the piping system type cannot be retrieved.
- "An error occurred while retrieving the piping system type: {ErrorMessage}" - Returned if an unexpected exception occurs.

Class SelectionExtensions

Namespace: [MBF.Revit.Data.Extensions](#)

Assembly: MBF.Revit.Data.dll

Provides extension methods for retrieving selected elements of specific types from a UIDocument.

```
[LogAspect]  
public static class SelectionExtensions
```

Inheritance

[object](#) ← SelectionExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetSelectedElements<T>(UIDocument)

Gets the selected elements of the specified type from the document.

```
public static List<T> GetSelectedElements<T>(this UIDocument uiDocument) where T : Element
```

Parameters

uiDocument UIDocument

The UIDocument to get the selected elements from.

Returns

[List](#)<T>

A list of the selected elements of the specified type.

Type Parameters

The type of elements to get.

Remarks

Error messages:

- Returns an empty list if no elements of the specified type are selected.
- Throws ArgumentNullException if **uiDocument** is null.

GetSelectedFamilyInstances(UIDocument)

Gets the selected family instances from the document.

```
public static List<FamilyInstance> GetSelectedFamilyInstances(this UIDocument uiDocument)
```

Parameters

uiDocument UIDocument

The UI document to get the selected family instances from.

Returns

[List](#)<FamilyInstance>

A list of the selected family instances.

Remarks

Error messages:

- Returns an empty list if no family instances are selected.

GetSelectedPipes(UIDocument)

Gets the selected pipes from the document.

```
public static List<Pipe> GetSelectedPipes(this UIDocument uiDocument)
```

Parameters

uiDocument UIDocument

The UI document to get the selected pipes from.

Returns

[List](#)<Pipe>

A list of the selected pipes.

Remarks

Error messages:

- Returns an empty list if no pipes are selected.

GetSelectedSpaces(UIDocument)

Gets the selected spaces from the document.

```
public static List<Space> GetSelectedSpaces(this UIDocument uiDocument)
```

Parameters

uiDocument UIDocument

The UI document to get the selected spaces from.

Returns

[List](#)<Space>

A list of the selected spaces.

Remarks

Error messages:

- Returns an empty list if no spaces are selected.

GetSelectedSprinklers(UIDocument)

Gets the selected sprinklers from the document. Filters the selected FamilyInstance elements to return only those categorized as BuiltInCategory.OST_Sprinklers.

```
public static List<FamilyInstance> GetSelectedSprinklers(this UIDocument uiDocument)
```

Parameters

uiDocument UIDocument

The UI document to get the selected sprinklers from.

Returns

[List](#)<FamilyInstance>

A list of the selected sprinkler family instances.

Remarks

Error messages:

- Returns an empty list if no sprinklers are selected.

Class SpaceExtensions

Namespace: [MBF.Revit.Data.Extensions](#)

Assembly: MBF.Revit.Data.dll

Provides extension methods for working with Autodesk.Revit.DB.Mechanical.Space objects, including retrieving boundary segments and validating the space.

```
[LogAspect]  
public static class SpaceExtensions
```

Inheritance

[object](#) ← SpaceExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains methods to assist in common operations related to Autodesk.Revit.DB.Mechanical.Space objects, such as extracting boundary curves and ensuring the validity of a space. These methods are designed to simplify working with spaces in spatial modeling scenarios.

Methods

GetBoundarySegment(Space)

Retrieves the boundary segments of a space as a list of curves.

```
public static MbResult<List<Curve>> GetBoundarySegment(this Space space)
```

Parameters

space Space

The space to get the boundary segments for.

Returns

[MbResult](#)<[List](#)><Curve>>

An [MbResult<T>](#) containing:

- A list of boundary curves if the operation is successful.
- An error message if the operation fails. Possible error messages include:

Validate(Space)

Validates the space object to ensure it is valid and has a positive area.

```
public static MbResult<bool> Validate(this Space space)
```

Parameters

space Space

The space to validate.

Returns

[MbResult](#)<[bool](#)>

An [MbResult<T>](#) containing:

- **true** if the space is valid.
- An error message if the validation fails. Possible error messages include:

Class ViewExtensions

Namespace: [MBF.Revit.Data.Extensions](#)

Assembly: MBF.Revit.Data.dll

Provides extension methods for working with Revit views.

```
[LogAspect]  
public static class ViewExtensions
```

Inheritance

[object](#) ← ViewExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains methods that extend the functionality of Revit views, enabling operations such as retrieving visible elements.

Methods

GetVisibleElements(View, Document)

Retrieves all elements that are visible in the specified Revit view.

```
public static MbResult<List<Element>> GetVisibleElements(this View view, Document document)
```

Parameters

view View

The Revit view to search for visible elements.

document Document

The Revit document containing the view.

Returns

[MbResult<List<Element>>](#)

An [MbResult<T>](#) object containing:

- A list of elements visible in the specified view if the operation is successful.
- A failure result with the following error messages for invalid parameters:
 - "The view parameter cannot be null."
 - "The document parameter cannot be null."

Namespace MBF.Revit.Data.Models

Classes

[MbDocument](#)

Represents a Revit document, including both standalone documents and linked documents.

Class MbDocument

Namespace: [MBF.Revit.Data.Models](#)

Assembly: MBF.Revit.Data.dll

Represents a Revit document, including both standalone documents and linked documents.

```
public class MbDocument
```

Inheritance

[object](#) ← MbDocument

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

The [MbDocument](#) class provides functionality to manage and retrieve information about Revit documents, including linked documents. It supports operations such as retrieving all linked documents associated with a base document and accessing properties like the transformation applied to a linked document or its parent document.

Constructors

MbDocument(Document)

Initializes a new instance of the [MbDocument](#) class for a standalone (non-linked) document.

```
public MbDocument(Document document)
```

Parameters

document Document

The standalone Revit document.

MbDocument(RevitLinkInstance, Document)

Initializes a new instance of the [MbDocument](#) class for a linked document.

```
public MbDocument(RevitLinkInstance linkInstance, Document parentDocument)
```

Parameters

linkInstance RevitLinkInstance

The Revit link instance referencing the linked document.

parentDocument Document

The parent document containing the link.

Properties

Document

Gets or sets the associated Revit [Document](#).

```
public Document Document { get; set; }
```

Property Value

Document

IsLinked

Gets or sets a value indicating whether this document is a linked document.

```
public bool IsLinked { get; set; }
```

Property Value

[bool](#)

LinkInstance

Gets or sets the Autodesk.Revit.DB.RevitLinkInstance that defines the link context.

```
public RevitLinkInstance LinkInstance { get; set; }
```

Property Value

RevitLinkInstance

LinkParentDocument

Gets or sets the parent document from which this link was referenced, if applicable.

```
public Document LinkParentDocument { get; set; }
```

Property Value

Document

LinkTransform

Gets or sets the transformation applied to the link instance.

```
public Transform LinkTransform { get; set; }
```

Property Value

Transform

Methods

GetAllDocuments(Document)

Retrieves a list of [MbDocument](#) instances including the base document and all linked documents.

```
public static List<MbDocument> GetAllDocuments(Document doc)
```

Parameters

doc Document

The base Revit document.

Returns

[List](#) <[MbDocument](#)>

A list of [MbDocument](#) objects.

GetLinkedDocuments(Document)

Retrieves all linked documents associated with the given base document.

```
public static List<MbDocument> GetLinkedDocuments(Document doc)
```

Parameters

doc Document

The base Revit document.

Returns

[List](#) <[MbDocument](#)>

A list of [MbDocument](#) objects representing the linked documents.

Namespace MBF.Revit.Data.SelectionFilters

Classes

[DynamicCategorySelectionFilter](#)

Represents a selection filter that dynamically allows elements based on their categories.

[FaceSelectionFilter](#)

Provides a selection filter for Revit elements and references, allowing selection of elements based on their category and ensuring that references correspond to geometric faces.

[HostOrLinkedCategorySelectionFilter](#)

A selection filter that allows selecting elements from the host or a linked Revit model, restricted to a specific set of categories.

[LinkedCategorySelectionFilter](#)

Selection filter for linked Revit documents that restricts selection to elements belonging to specified categories within a selected MBF.Revit.Data.SelectionFilters.LinkedCategorySelectionFilter.RevitLink Instance.

Class DynamicCategorySelectionFilter

Namespace: [MBF.Revit.Data.SelectionFilters](#)

Assembly: MBF.Revit.Data.dll

Represents a selection filter that dynamically allows elements based on their categories.

```
[LogAspect]  
public class DynamicCategorySelectionFilter : ISelectionFilter
```

Inheritance

[object](#) ← DynamicCategorySelectionFilter

Implements

ISelectionFilter

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This filter is designed to restrict selection to elements belonging to specific categories. It supports both Revit 2024+ (long-based ElementId) and earlier versions (int-based ElementId).

Constructors

DynamicCategorySelectionFilter(params BuiltInCategory[])

Initializes a new instance of the [DynamicCategorySelectionFilter](#) class with the specified categories that should be allowed during selection.

```
public DynamicCategorySelectionFilter(params BuiltInCategory[] categories)
```

Parameters

categories BuiltInCategory[]

An array of BuiltInCategory values to allow.

Methods

AllowElement(Element)

Determines whether a specific element is allowed for selection.

```
public bool AllowElement(Element element)
```

Parameters

element Element

The element being evaluated.

Returns

bool ↗

true if the element belongs to one of the allowed categories; otherwise, **false**.

AllowReference(Reference, XYZ)

Determines whether a reference (face, edge, etc.) is allowed for selection. This implementation disallows reference-based selection and only allows full element selection.

```
public bool AllowReference(Reference reference, XYZ position)
```

Parameters

reference Reference

The reference being evaluated.

position XYZ

The 3D position associated with the reference.

Returns

bool ↗

Always returns **false** to disable reference selection.

Class FaceSelectionFilter

Namespace: [MBF.Revit.Data.SelectionFilters](#)

Assembly: MBF.Revit.Data.dll

Provides a selection filter for Revit elements and references, allowing selection of elements based on their category and ensuring that references correspond to geometric faces.

```
[LogAspect]  
public class FaceSelectionFilter : ISelectionFilter
```

Inheritance

[object](#) ← FaceSelectionFilter

Implements

ISelectionFilter

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This filter can be used to restrict element selection to specific categories or to ensure that only face references are considered valid. It supports two modes of operation:

- Allowing all element categories by default.
- Restricting selection to specific categories by providing a list of allowed categories.

The filter is particularly useful in scenarios where precise control over element or reference selection is required, such as in custom Revit add-ins or tools.

Constructors

FaceSelectionFilter(Document)

Initializes a new instance of the [FaceSelectionFilter](#) that allows all element categories.

```
public FaceSelectionFilter(Document document)
```

Parameters

document Document

The current Revit document.

FaceSelectionFilter(Document, BuiltInCategory)

Initializes a new instance of the [FaceSelectionFilter](#) that only allows elements from the specified category.

```
public FaceSelectionFilter(Document document, BuiltInCategory category)
```

Parameters

document Document

The current Revit document.

category BuiltInCategory

A single allowed BuiltInCategory for selection.

Methods

AllowElement(Element)

Determines whether the given element is eligible for selection based on its category.

```
public bool AllowElement(Element element)
```

Parameters

element Element

The element to evaluate.

Returns

[bool](#)

true if the element is in the allowed category list (or all are allowed); otherwise, **false**.

AllowReference(Reference, XYZ)

Determines whether the referenced geometry is a face.

```
public bool AllowReference(Reference refer, XYZ point)
```

Parameters

refer Reference

The reference to check.

point XYZ

The point on the geometry (not used).

Returns

bool ↗

true if the reference is to a face; otherwise, **false**.

Class HostOrLinkedCategorySelectionFilter

Namespace: [MBF.Revit.Data.SelectionFilters](#)

Assembly: MBF.Revit.Data.dll

A selection filter that allows selecting elements from the host or a linked Revit model, restricted to a specific set of categories.

```
[LogAspect]  
public class HostOrLinkedCategorySelectionFilter : ISelectionFilter
```

Inheritance

[object](#) ← HostOrLinkedCategorySelectionFilter

Implements

ISelectionFilter

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

Error messages:

- If `categories` is `null` in the constructor, an empty list is used.
- If `_revitLinkInstance` is `null` in [AllowReference\(Reference, XYZ\)](#), returns `false`.
- If `linkedDoc` is `null` in [AllowReference\(Reference, XYZ\)](#), returns `false`.

Constructors

HostOrLinkedCategorySelectionFilter(IEnumerable<Category>)

Initializes a new instance of the [HostOrLinkedCategorySelectionFilter](#) class.

```
public HostOrLinkedCategorySelectionFilter(IEnumerable<Category> categories)
```

Parameters

categories [IEnumerable](#)<Category>

The categories to allow from both host and linked documents.

Remarks

- If `categories` is `null`, an empty list is used.

Methods

AllowElement(Element)

Determines whether an element can be selected directly.

```
public bool AllowElement(Element elem)
```

Parameters

`elem` Element

The element being evaluated.

Returns

[bool](#)

`true` if it's a host element in the allowed categories or a Autodesk.Revit.DB.RevitLinkInstance; otherwise, `false`.

AllowReference(Reference, XYZ)

Determines whether a reference (e.g. in a linked file) is selectable.

```
public bool AllowReference(Reference reference, XYZ position)
```

Parameters

`reference` Reference

The reference to the element.

`position XYZ`

The selection point (not used).

Returns

`bool` ↗

`true` if the referenced element's category is allowed; otherwise, `false`.

Remarks

- Returns `false` if `_revitLinkInstance` is `null`.
- Returns `false` if `linkedDoc` is `null`.

Class LinkedCategorySelectionFilter

Namespace: [MBF.Revit.Data.SelectionFilters](#)

Assembly: MBF.Revit.Data.dll

Selection filter for linked Revit documents that restricts selection to elements belonging to specified categories within a selected MBF.Revit.Data.SelectionFilters.LinkedCategorySelectionFilter.RevitLink Instance.

```
[LogAspect]  
public class LinkedCategorySelectionFilter : ISelectionFilter
```

Inheritance

[object](#) ← LinkedCategorySelectionFilter

Implements

ISelectionFilter

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

LinkedCategorySelectionFilter(IEnumerable<Category>)

Initializes a new instance of the [LinkedCategorySelectionFilter](#) class.

```
public LinkedCategorySelectionFilter(IEnumerable<Category> categories)
```

Parameters

categories [IEnumerable](#)<Category>

The categories to allow from the linked document.

Remarks

- If **categories** is **null**, an empty list is used.

Methods

AllowElement(Element)

Determines whether an element is selectable. Only allows selecting MBF.Revit.Data.SelectionFilters.LinkedCategorySelectionFilter.RevitLinkInstance elements.

```
public bool AllowElement(Element elem)
```

Parameters

elem Element

The element to evaluate.

Returns

bool ↗

true if the element is a MBF.Revit.Data.SelectionFilters.LinkedCategorySelectionFilter.RevitLinkInstance; otherwise, **false**.

Remarks

- Returns **false** if the element is not a MBF.Revit.Data.SelectionFilters.LinkedCategorySelectionFilter.RevitLinkInstance.

AllowReference(Reference, XYZ)

Determines whether a referenced element inside the selected linked model is allowed.

```
public bool AllowReference(Reference reference, XYZ position)
```

Parameters

reference Reference

The reference to an element in the linked model.

position XYZ

The point on the element being selected (not used).

Returns

[bool](#) ↗

true if the linked element belongs to one of the allowed categories; otherwise, **false**.

Remarks

- Returns **false** if no MBF.Revit.Data.SelectionFilters.LinkedCategorySelectionFilter.RevitLinkInstance has been selected.
- Returns **false** if the referenced element does not exist or its category is not allowed.

Namespace MBF.Revit.Data.Utils

Classes

[EntityUtils](#)

Provides utility methods for working with entities and their associated fields, enabling the retrieval and assignment of values such as Autodesk.Revit.DB.XYZ and ElementId.

[MbFlexPipesUtils](#)

Filters the provided collection of Revit elements and retrieves all flex pipes.

[MbParameterUtils](#)

Provides utility methods for working with Revit parameters.

[MbPipeAccessoriesUtils](#)

Provides utility methods for working with pipe accessory elements in Revit.

[MbPipeFittingsUtils](#)

Provides utility methods for working with pipe fittings in Revit.

[MbPipesUtils](#)

Provides utility methods for working with pipe elements in Revit.

[MbSpaceUtils](#)

Provides utility methods for working with Autodesk.Revit.DB.Mechanical.Space elements in Autodesk Revit.

[MbSprinklersUtils](#)

Provides utility methods for working with sprinkler elements in Revit.

[MbUnitUtils](#)

Provides utility methods for working with measurement units in Revit.

[MbViewUtils](#)

Provides utility methods for working with Revit views, including graphical view checks, zooming to elements, creating temporary 3D views, and managing view isolation.

[RevitUnitUtils](#)

Determines whether the units of the specified Revit document are metric.

[XyzExtensibleStorage](#)

Provides utilities for reading and writing Autodesk.Revit.DB.XYZ start point data for Autodesk.Revit.DB.Plumbing.Pipe elements using Revit's Extensible Storage API.

Enums

[PipePointType](#)

Represents a specific point along a pipe, either at the start or the end.

Class EntityUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with entities and their associated fields, enabling the retrieval and assignment of values such as Autodesk.Revit.DB.XYZ and ElementId.

```
[LogAspect]  
public static class EntityUtils
```

Inheritance

[object](#) ← EntityUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

The [EntityUtils](#) class adapts to different runtime environments to ensure compatibility with varying unit systems. It includes methods for retrieving and setting field values in entities, handling both Autodesk.Revit.DB.XYZ and ElementId types. This class is designed for use in scenarios where precise handling of units and field data is required.

Error messages:

- Entity or field cannot be null.
- Value cannot be null.
- Failed to retrieve or set the specified field value.

Methods

GetElementId(Entity, Field)

Retrieves the ElementId value associated with the specified [field](#) in the given [entity](#).

```
public static ElementId GetElementId(Entity entity, Field field)
```

Parameters

entity Entity

The Autodesk.Revit.DB.ExtensibleStorage.Entity from which to retrieve the ElementId value. Cannot be [null](#).

field Field

The Autodesk.Revit.DB.ExtensibleStorage.Field that identifies the data to retrieve. Cannot be [null](#).

Returns

ElementId

The ElementId value associated with the specified **field** in the **entity**.

Remarks

The method retrieves the ElementId value using the appropriate unit system based on the runtime environment.

Error messages:

- Entity or field cannot be null.
- Failed to retrieve the ElementId value from the entity.

GetXYZ(Entity, Field)

Retrieves the Autodesk.Revit.DB.XYZ value of the specified field from the given entity.

```
public static XYZ GetXYZ(Entity entity, Field field)
```

Parameters

entity Entity

The entity from which to retrieve the Autodesk.Revit.DB.XYZ value. Cannot be [null](#).

field Field

The field that specifies which Autodesk.Revit.DB.XYZ value to retrieve. Cannot be [null](#).

Returns

XYZ

The Autodesk.Revit.DB.XYZ value associated with the specified field in the entity.

Remarks

The method adapts to different versions of the API to ensure compatibility.

Error messages:

- Entity or field cannot be null.
- Failed to retrieve the XYZ value from the entity.

SetElementId(Entity, Field, ElementId)

Sets the specified ElementId value for the given Autodesk.Revit.DB.ExtensibleStorage.Entity and Autodesk.Revit.DB.ExtensibleStorage.Field.

```
public static void SetElementId(Entity entity, Field field, ElementId value)
```

Parameters

entity Entity

The Autodesk.Revit.DB.ExtensibleStorage.Entity to which the value will be assigned. Cannot be [null](#).

field Field

The Autodesk.Revit.DB.ExtensibleStorage.Field that identifies the property to set. Cannot be [null](#).

value ElementId

The ElementId value to assign to the specified field. Cannot be [null](#).

Remarks

The method ensures compatibility with different versions of the API by using the appropriate unit type when setting the value.

Error messages:

- Entity, field, or value cannot be null.
- Failed to set the ElementId value for the specified field.

SetXYZ(Entity, Field, XYZ)

Sets the specified field of the given entity to the provided XYZ value, using the appropriate unit system.

```
public static void SetXYZ(Entity entity, Field field, XYZ value)
```

Parameters

entity Entity

The entity whose field is to be updated. Cannot be null.

field Field

The field of the entity to set. Cannot be null.

value XYZ

The XYZ value to assign to the specified field. Cannot be null.

Remarks

The method determines the appropriate unit system based on the runtime environment and applies it when setting the field.

Error messages:

- Entity, field, or value cannot be null.
- Failed to set the XYZ value for the specified field.

Class MbFlexPipesUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Filters the provided collection of Revit elements and retrieves all flex pipes.

```
[LogAspect]  
public static class MbFlexPipesUtils
```

Inheritance

[object](#) ← MbFlexPipesUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This method ensures that only elements categorized as flex pipes (`BuiltInCategory.OST_FlexPipeCurves`) are returned. It uses the category information of each element to perform the filtering.

Methods

GetFlexPipeInstances(IEnumerable<Element>)

Filters the provided collection of Revit elements and retrieves all flex pipes.

```
public static IEnumerable<FlexPipe> GetFlexPipeInstances(IEnumerable<Element>  
selectedElements)
```

Parameters

`selectedElements` [IEnumerable](#)<Element>

A collection of Revit elements to filter.

Returns

[IEnumerable](#) <FlexPipe>

An [IEnumerable<T>](#) of Autodesk.Revit.DB.Plumbing.FlexPipe objects.

Remarks

This method ensures that only elements categorized as flex pipes (BuiltInCategory.OST_FlexPipeCurves) are returned.

Possible error messages:

- **ArgumentNullException**: Thrown if `selectedElements` is null.
- **InvalidOperationException**: Thrown if an element cannot be cast to Autodesk.Revit.DB.Plumbing.FlexPipe.

Class MbParameterUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with Revit parameters.

```
[LogAspect]  
public static class MbParameterUtils
```

Inheritance

[object](#) ← MbParameterUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetParameterValue(StorageType, Parameter)

Retrieves the string representation of a parameter's value based on its Autodesk.Revit.DB.StorageType.

```
public static string GetParameterValue(StorageType storageType, Parameter instanceParameter)
```

Parameters

storageType StorageType

The storage type of the parameter (e.g. Double, Integer, String, ElementId).

instanceParameter Parameter

The parameter from which to extract the value.

Returns

[string](#)

A string representation of the parameter's value.

Possible error messages:

- "**N/A**" - Returned if the parameter value is a string and is **null**.
- "**Unsupported Type**" - Returned if the storage type is not supported.

Class MbPipeAccessoriesUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with pipe accessory elements in Revit.

```
[LogAspect]  
public static class MbPipeAccessoriesUtils
```

Inheritance

[object](#) ← MbPipeAccessoriesUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains methods to filter and retrieve Revit elements categorized as pipe accessories. It is designed to work with collections of Revit elements and supports conditional compilation for compatibility with different Revit versions.

Methods

GetPipeAccessoriesInstances(IEnumerable<Element>)

Retrieves all FamilyInstance elements categorized as pipe accessories from the provided collection of Revit elements.

```
public static IEnumerable<FamilyInstance> GetPipeAccessoriesInstances(IEnumerable<Element>  
selectedElements)
```

Parameters

`selectedElements` [IEnumerable](#)<Element>

A collection of Element objects to search within.

Returns

[IEnumerable](#) <FamilyInstance>

An [IEnumerable<T>](#) containing all elements from `selectedElements` that are instances of families and belong to the `BuiltInCategory.OST_PipeAccessory` category.

Remarks

This method filters the input collection to include only elements whose category is "Pipe Accessories", then casts those elements to FamilyInstance for further use. The filtering logic uses conditional compilation to support different Revit versions.

Possible error messages:

- **ArgumentNullException:** Thrown if `selectedElements` is null.
- **InvalidOperationException:** Thrown if an element cannot be cast to FamilyInstance (should not occur due to `OfType` usage).

Class MbPipeFittingsUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with pipe fittings in Revit.

```
[LogAspect]  
public static class MbPipeFittingsUtils
```

Inheritance

[object](#) ← MbPipeFittingsUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

FittingSizeIsEqual(FamilyInstance)

Checks if all connectors of a given fitting have equal sizes (radius).

```
public static MbResult<bool> FittingSizeIsEqual(FamilyInstance instance)
```

Parameters

instance FamilyInstance

The FamilyInstance of the fitting to check.

Returns

[MbResult<bool>](#)

Returns an [MbResult<T>](#) where T is [bool](#):

- If [.IsSuccess](#) is [true](#), the operation completed successfully.
- If [Value](#) is [true](#), all connectors have equal sizes or there are fewer than two connectors.
- If [Value](#) is [false](#), connectors have different sizes.

- If `.IsSuccess` is `false`, an error occurred, and `ErrorMessage` provides details:
 - "Instance is null."

GetAngleBetweenLargestRadiusConnectors(FamilyInstance)

Calculates the angle between the two connectors with the largest radius in the given `FamilyInstance`.

```
public static MbResult<double> GetAngleBetweenLargestRadiusConnectors(FamilyInstance instance)
```

Parameters

`instance` `FamilyInstance`

The `FamilyInstance` containing connectors to analyze.

Returns

[MbResult<double>](#)

Returns an [MbResult<T>](#) where `T` is `double`:

- If `.IsSuccess` is `true`, the operation completed successfully.
- If `Value` is a valid angle, it represents the computed angle between the two connectors with the largest radius.
- If `.IsSuccess` is `false`, an error occurred, and `ErrorMessage` provides details:
 - "FamilyInstance is null."

GetAngleBetweenLargestRadiusConnectors(List<Connector>)

Calculates the angle between the two connectors with the largest radius in the given list of connectors.

```
public static MbResult<double> GetAngleBetweenLargestRadiusConnectors(List<Connector> connectors)
```

Parameters

`connectors` [List<Connector>](#)

A list of connectors to analyze.

Returns

[MbResult<double>](#)

Returns an [MbResult<T>](#) where T is `double`:

- If `.IsSuccess` is `true`, the operation completed successfully.
- If `Value` is a valid angle, it represents the computed angle between the two connectors with the largest radius.
- If `.IsSuccess` is `false`, an error occurred, and `ErrorMessage` provides details:
 - "At least two connectors are required."

GetElbowsFamilyInstances(IEnumerable<Element>)

Filters the provided collection of Revit elements and retrieves all pipe fitting family instances that are categorized as "Elbow" fittings.

```
public static IEnumerable<FamilyInstance> GetElbowsFamilyInstances(IEnumerable<Element>
selectedElements)
```

Parameters

`selectedElements` [IEnumerable<Element>](#)

A collection of Revit elements to filter.

Returns

[IEnumerable<FamilyInstance>](#)

An [IEnumerable<T>](#) of `FamilyInstance` objects representing elbow fittings.

Remarks

This method ensures that only elements categorized as pipe fittings (`BuiltInCategory.OST_PipeFitting`) and specifically of type `PartType.Elbow` are returned.

GetFarthestConnectorSize(FamilyInstance, Pipe)

Returns the size (diameter) of the valid round connector that is farthest from the given pipe.

```
public static double? GetFarthestConnectorSize(FamilyInstance fitting, Pipe pipe)
```

Parameters

fitting FamilyInstance

The outlet fitting instance.

pipe Pipe

The reference pipe to compare distance against.

Returns

[double](#)?

The diameter (in internal units) of the farthest valid round connector; or null if none found.

GetOrderedConnectorSizesInInch(Element, bool)

Retrieves a sorted list of connector sizes (diameters) in inches for a given Element that is an Autodesk.Revit.DB.MEPCurve.

```
public static MbResult<List<double>> GetOrderedConnectorSizesInInch(Element element, bool  
isAscending = true)
```

Parameters

element Element

The Element representing an Autodesk.Revit.DB.MEPCurve.

isAscending [bool](#)

Specifies whether to sort the sizes in ascending (true) or descending (false) order.

Returns

[MbResult](#)<[List](#)<[double](#)>>

An [MbResult](#)<T> where T is [List](#)<T>:

- If **IsSuccess** is **true**, the operation completed successfully.
- The list contains the diameters of all connectors in inches, sorted in the specified order.
- If **IsSuccess** is **false**, an error occurred, and **ErrorMessage** provides details:
 - "Element is null."

- "No connectors found."

GetOrderedConnectorSizesInInch(FamilyInstance, bool)

Retrieves a sorted list of connector sizes (diameters) for a given fitting.

```
public static MbResult<List<double>> GetOrderedConnectorSizesInInch(FamilyInstance instance,
bool isAscending = true)
```

Parameters

instance FamilyInstance

The Autodesk.Revit.DB.FamilyInstance representing the fitting.

isAscending [bool](#)

Specifies whether to sort the sizes in ascending (true) or descending (false) order.

Returns

[MbResult<List<double>>](#)

An [MbResult<T>](#) where T is [List<T>](#):

- If **IsSuccess** is **true**, the operation completed successfully.
- The list contains the diameters of all connectors in the specified order.
- If **IsSuccess** is **false**, an error occurred and **ErrorMessage** provides details:
 - "Instance is null."
 - "No connectors found."

GetOtherFittingWhichIsNotElbowsOrTeesOrOutletsFamilyInstances(IEnumerable<Element>)

Filters the provided collection of Revit elements and retrieves all pipe fitting family instances that are not categorized as "Tee", "Elbow", or "Outlets" fittings.

```
public static IEnumerable<FamilyInstance>
GetOtherFittingWhichIsNotElbowsOrTeesOrOutletsFamilyInstances(IEnumerable<Element>
selectedElements)
```

Parameters

selectedElements [IEnumerable](#)<Element>

A collection of Revit elements to filter.

Returns

[IEnumerable](#)<FamilyInstance>

An [IEnumerable](#)<T> of FamilyInstance objects representing fittings that are not tee, elbow, or outlet fittings.

Remarks

This method ensures that only elements categorized as pipe fittings (BuiltInCategory.OST_PipeFitting) and excluding types PartType.Tee, PartType.Elbow, or PartType.SpudAdjustable are returned.

GetOutletDirectionCode(Pipe, FamilyInstance)

Determines the outlet orientation code (e.g., 1 = Top, 2 = Right, etc.) relative to the pipe axis, based on job file standards.

```
public static double GetOutletDirectionCode(Pipe pipe, FamilyInstance outlet)
```

Parameters

pipe Pipe

The host pipe.

outlet FamilyInstance

The outlet FamilyInstance.

Returns

[double](#)

Directional code (1.0 = Top, 1.5 = Top-Right 45°, etc.), or -1 if undetermined.

- -1: No matching direction found within tolerance or outlet connector not found.

GetOutletsFamilyInstances(IEnumerable<Element>)

Filters the provided collection of Revit elements and retrieves all pipe fitting family instances that are categorized as "Outlets" (Spud Adjustable) fittings.

```
public static IEnumerable<FamilyInstance> GetOutletsFamilyInstances(IEnumerable<Element> selectedElements)
```

Parameters

selectedElements [IEnumerable](#)<Element>

A collection of Revit elements to filter.

Returns

[IEnumerable](#)<FamilyInstance>

An [IEnumerable](#)<T> of FamilyInstance objects representing outlet fittings.

Remarks

This method ensures that only elements categorized as pipe fittings (BuiltInCategory.OST_PipeFitting) and specifically of type PartType.SpudAdjustable (representing outlets) are returned.

GetPerpendicularClockwise(XYZ)

Returns a vector perpendicular to the input vector in the clockwise direction, on the XY plane.

```
public static XYZ GetPerpendicularClockwise(this XYZ vector)
```

Parameters

vector XYZ

Input vector.

Returns

XYZ

Clockwise perpendicular vector on XY plane.

GetPerpendicularCounterClockwise(XYZ)

Returns a vector perpendicular to the input vector in the counter-clockwise direction, on the XY plane.

```
public static XYZ GetPerpendicularCounterClockwise(this XYZ vector)
```

Parameters

vector XYZ

Input vector.

Returns

XYZ

Counter-clockwise perpendicular vector on XY plane.

GetPerpendicularPlaneAxes(XYZ)

Returns a tuple of two orthogonal vectors that define a plane perpendicular to the input vector: - First: a stable perpendicular vector (clockwise or counter-clockwise). - Second: the cross-product (normal) to establish a consistent plane direction.

```
public static (XYZ Perpendicular, XYZ Normal) GetPerpendicularPlaneAxes(this  
XYZ pipeDirection)
```

Parameters

pipeDirection XYZ

The primary pipe direction vector.

Returns

(XYZ [Perpendicular](#), XYZ [Normal](#))

A tuple (perpendicular, normal) defining the orientation plane.

GetTeeFamilyInstances(IEnumerable<Element>)

Filters the provided collection of Revit elements and retrieves all pipe fitting family instances that are categorized as "Tee" fittings.

```
public static IEnumerable<FamilyInstance> GetTeeFamilyInstances(IEnumerable<Element> selectedElements)
```

Parameters

selectedElements [IEnumerable](#)<Element>

A collection of Revit elements to filter.

Returns

[IEnumerable](#)<FamilyInstance>

An [IEnumerable](#)<T> of FamilyInstance objects representing tee fittings.

Remarks

This method ensures that only elements categorized as pipe fittings (BuiltInCategory.OST_PipeFitting) and specifically of type PartType.Tee are returned.

GetValidOutletConnectors(FamilyInstance)

Returns only valid round connectors from the outlet fitting.

```
public static List<Connector> GetValidOutletConnectors(FamilyInstance fitting)
```

Parameters

fitting FamilyInstance

The outlet fitting instance.

Returns

[List](#)<Connector>

A list of connectors that are round and not owned by a Autodesk.Revit.DB.Plumbing.PipingSystem.

Class MbPipesUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with pipe elements in Revit.

```
[LogAspect]  
public static class MbPipesUtils
```

Inheritance

[object](#) ← MbPipesUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

ArePointsClose(FamilyInstance, FamilyInstance, double)

Determines whether the locations of two FamilyInstance objects are within a specified distance threshold.

```
public static bool ArePointsClose(FamilyInstance a, FamilyInstance b, double threshold)
```

Parameters

a FamilyInstance

The first FamilyInstance. Must not be [null](#).

b FamilyInstance

The second FamilyInstance. Must not be [null](#).

threshold [double](#)

The maximum distance, in the same units as the points' coordinates, within which the two instances are considered close.

Returns

[bool](#)

[true](#) if the distance between the locations of [a](#) and [b](#) is less than [threshold](#); otherwise, [false](#).

Remarks

If either [a](#) or [b](#) is [null](#), or if their locations cannot be determined, the method returns [false](#).

ArePointsSame(XYZ, XYZ)

Determines whether two points in 3D space are considered the same based on a small tolerance.

```
public static bool ArePointsSame(XYZ point1, XYZ point2)
```

Parameters

[point1](#) XYZ

The first point to compare.

[point2](#) XYZ

The second point to compare.

Returns

[bool](#)

[true](#) if the distance between [point1](#) and [point2](#) is less than 0.01; otherwise, [false](#).

Remarks

This method uses a fixed tolerance of 0.01 to account for minor differences in floating-point calculations.

FamilyIsOutsideLine(FamilyInstance, Line)

Determines whether the specified family instance is outside the given line.

```
public static bool FamilyIsOutsideLine(FamilyInstance familyInstance, Line line)
```

Parameters

familyInstance FamilyInstance

The family instance to evaluate. Must have a valid Autodesk.Revit.DB.LocationPoint.

line Line

The line against which the family instance's position is evaluated.

Returns

bool

true if the family instance is projected onto one of the endpoints of the line; otherwise, false.

Remarks

This method checks if the projection of the family instance's location point onto the specified line coincides with either of the line's endpoints. If the family instance does not have a valid Autodesk.Revit.DB.LocationPoint , the method returns false.

FindNearbyUnconnectedConnector(XYZ, Document, List<ElementId>, HashSet<int>, string)

Finds the nearest unconnected connector to a specified point within a given document.

```
public static Connector FindNearbyUnconnectedConnector(XYZ targetPoint, Document doc,
List<ElementId> excludedElementIds, HashSet<int> discoveredElementIds = null, string caller
= null)
```

Parameters

targetPoint XYZ

The target point in 3D space to search for nearby connectors.

doc Document

The Revit document containing the elements to search.

excludedElementIds List<ElementId>

A list of element IDs to exclude from the search.

discoveredElementIds [HashSet<int>](#)

An optional set of element IDs that have already been processed. These elements will be excluded from the search.

caller [string](#)

The name of the calling method, automatically provided by the compiler. Used to adjust behavior for specific callers.

Returns

Connector

The nearest unconnected Connector to the [targetPoint](#), or [null](#) if no suitable connector is found.

Remarks

This method searches for connectors within a bounding box centered on the [targetPoint](#). It filters out connectors belonging to elements that are excluded or already processed, as well as connectors whose owners are subcomponents of other elements. The method prioritizes connectors based on their proximity to the [targetPoint](#) and returns the closest one within its connection radius.

GetConnectedFittingsBothSidesOfPipe(Document, Pipe)

Retrieves the connectors of fittings connected to both ends of a specified pipe.

```
public static List<Connector> GetConnectedFittingsBothSidesOfPipe(Document doc, Pipe pipe)
```

Parameters

doc Document

The Revit document containing the pipe and its connected elements.

pipe Pipe

The pipe for which to find connected fittings on both ends.

Returns

[List](#) <Connector>

A list of Connector objects representing the connectors of fittings connected to both ends of the specified pipe. The list will be empty if no fittings are connected.

Remarks

This method identifies fittings connected to the pipe's end connectors and includes only those fittings that are spuds, tees, or elbows. If no fittings are found, the method attempts to locate connectors based on the pipe's nearest endpoints.

GetConnectedFittingsOnCurve(Pipe)

Retrieves a list of fittings connected to the specified pipe along its curve connectors.

```
public static List<FamilyInstance> GetConnectedFittingsOnCurve(this Pipe pipe)
```

Parameters

pipe Pipe

The pipe for which to find connected fittings. Cannot be [null](#).

Returns

[List](#) <FamilyInstance>

A list of FamilyInstance objects representing the fittings connected to the pipe. The list will be empty if no fittings are connected.

Remarks

This method examines the curve-type connectors of the specified pipe and identifies any connected fittings. Only fittings directly connected to the pipe's curve connectors are included in the result.

GetConnectorsForElement(Element)

Retrieves a list of valid connectors associated with the specified element.

```
public static List<Connector> GetConnectorsForElement(Element element)
```

Parameters

element Element

The element for which to retrieve the connectors. Must not be [null](#).

Returns

[List](#)<Connector>

A list of Connector objects that are valid and associated with the specified element. If no valid connectors are found, an empty list is returned.

GetEndConnectors(Pipe)

Returns the end connectors of a pipe, excluding those owned by a Autodesk.Revit.DB.Plumbing.Piping System.

```
public static List<Connector> GetEndConnectors(this Pipe pipe)
```

Parameters

pipe Pipe

The pipe to evaluate.

Returns

[List](#)<Connector>

A list of end Connector objects not owned by a piping system.

GetEndPoint(Pipe, PipePointType)

Retrieves the specified endpoint of the pipe.

```
public static XYZ GetEndPoint(this Pipe pipe, PipePointType pipePointType)
```

Parameters

pipe Pipe

The pipe from which to retrieve the endpoint.

pipePointType [PipePointType](#)

Specifies whether to retrieve the start or end point of the pipe.

Returns

XYZ

The endpoint of the pipe as specified by **pipePointType**.

GetFarSideConnectedToFamilyInstance(Document, Pipe, XYZ)

Gets the connector on the far end of the pipe (opposite to the reference point) that is connected to a FamilyInstance.

```
public static Connector GetFarSideConnectedToFamilyInstance(Document doc, Pipe pipe,  
XYZ referencePoint)
```

Parameters

doc Document

The Revit document.

pipe Pipe

The pipe to evaluate.

referencePoint XYZ

A point used to identify the far end of the pipe.

Returns

Connector

The connected Connector on the far side, or null if not found.

GetFittingAtFarthestConnector(Pipe, XYZ)

Finds the fitting connected to the farthest connector of a pipe from the given start point.

```
public static MbResult<Element> GetFittingAtFarthestConnector(Pipe pipe, XYZ startPoint)
```

Parameters

pipe Pipe

The pipe element to inspect.

startPoint XYZ

The reference point to compare connector distances to.

Returns

[MbResult<Element>](#)

A containing the connected fitting element, or a failure message if not found.

GetFittingsOnPipe(Document, Pipe, XYZ)

Retrieves a list of fitting element IDs that are associated with the specified pipe.

```
public static List<ElementId> GetFittingsOnPipe(Document doc, Pipe pipe, XYZ sortingPoint  
= null)
```

Parameters

doc Document

The Revit document containing the pipe and fittings.

pipe Pipe

The pipe for which to find associated fittings. Must be a valid pipe element.

sortingPoint XYZ

An optional point used to sort the fittings by proximity. If [null](#), the fittings are not sorted.

Returns

[List](#) <ElementId>

A list of ElementId objects representing the fittings associated with the pipe. The list may be empty if no fittings are found.

Remarks

This method identifies fittings associated with the pipe based on several criteria, including:

- Fittings that intersect the pipe's solid geometry.
- Fittings that are within a proximity threshold of the pipe's centerline.
- Fittings that are well-connected to the pipe's curve.

Duplicate fittings are removed, and fittings at the pipe's endpoints are excluded from the result. If a **sortingPoint** is provided, the fittings are sorted by their proximity to the point.

GetLineOfPipe(Pipe)

Retrieves the geometric line representation of the specified pipe.

```
public static Line GetLineOfPipe(this Pipe pipe)
```

Parameters

pipe Pipe

The pipe for which to retrieve the line representation. Cannot be [null](#).

Returns

Line

A Autodesk.Revit.DB.Line object representing the pipe's geometry. If the pipe has a stored start point, the line is created using the start point and the nearest endpoint. Otherwise, the line is created using the pipe's start and end points.

Remarks

This method determines the line representation of a pipe based on its stored start point, if available, or its defined start and end points. The returned line can be used for geometric calculations or visualization.

GetPipeCurve(Pipe)

Retrieves the geometric curve that defines the center line of the specified pipe.

```
public static Curve GetPipeCurve(this Pipe pipe)
```

Parameters

pipe Pipe

The pipe from which to retrieve the center line curve. Must not be .

Returns

Curve

The representing the center line of the pipe, or if the pipe does not have a valid location curve.

Remarks

This method extracts the form the of the pipe. Ensure that the pipe has a valid location curve before calling this method.

GetPipeInstances(IEnumerable<Element>)

Retrieves all pipe instances from the specified collection of Revit elements.

```
public static IEnumerable<Pipe> GetPipeInstances(IEnumerable<Element> pipeSelectedElements)
```

Parameters

pipeSelectedElements [IEnumerable](#)<Element>

A collection of Revit elements to filter for pipe instances.

Returns

[IEnumerable](#)<Pipe>

An enumerable collection of Autodesk.Revit.DB.Plumbing.Pipe objects representing the pipe instances found in the input collection. If no pipe instances are found, the returned collection will be empty.

Remarks

This method filters the provided elements to include only those that belong to the "Pipe Curves" category and are of type Autodesk.Revit.DB.Plumbing.Pipe. The filtering logic adapts to the Revit version being used.

GetValidSpudFittings(Document)

Retrieves a list of valid spud fittings from the specified document.

```
public static List<FamilyInstance> GetValidSpudFittings(this Document doc)
```

Parameters

doc Document

The Revit document to search for spud fittings.

Returns

[List](#)<FamilyInstance>

A list of FamilyInstance objects representing valid spud fittings in the document. The list will be empty if no valid spud fittings are found.

Remarks

This method filters elements in the document to include only pipe fittings that are instances of Family Instance and meet specific criteria for validity. Elements that do not pass the validity check are excluded.

IsPointOnPipeEndPoints(XYZ, Pipe)

Determines whether the specified point is located on one of the endpoints of the given pipe.

```
public static bool IsPointOnPipeEndPoints(XYZ point, Pipe pipe)
```

Parameters

point XYZ

The point to check.

pipe Pipe

The pipe whose endpoints are to be evaluated.

Returns

[bool](#)

[true](#) if the specified point is on one of the pipe's endpoints; otherwise, [false](#) .

IsSpudAtEndPointsOfPipe(Pipe, ElementId, Document)

Determines whether the specified element is located at either endpoint of the given pipe.

```
public static bool IsSpudAtEndPointsOfPipe(Pipe pipe, ElementId elementId, Document doc)
```

Parameters

pipe Pipe

The pipe to check for endpoint connections.

elementId ElementId

The ID of the element to evaluate.

doc Document

The document containing the pipe and element.

Returns

[bool](#)

[true](#) if the element is located at one of the endpoints of the pipe; otherwise, [false](#) .

IsSpudFitting(FamilyInstance)

Determines whether the specified FamilyInstance represents a spud fitting.

```
public static bool IsSpudFitting(FamilyInstance instance)
```

Parameters

instance FamilyInstance

The FamilyInstance to evaluate. Must not be [null](#).

Returns

[bool](#)

[true](#) if the **instance** is a spud fitting; otherwise, [false](#).

Remarks

A spud fitting is identified as a FamilyInstance with no FamilyInstance.SuperComponent and an Autodesk.Revit.DB.MEPModel of type Autodesk.Revit.DB.Mechanical.MechanicalFitting where the Autodesk.Revit.DB.Mechanical.MechanicalFitting.PartType is either PartType.SpudAdjustable or PartType.SpudPerpendicular .

IsTeeOrElbowFitting(FamilyInstance)

Determines whether the specified FamilyInstance represents a tee or elbow fitting.

```
public static bool IsTeeOrElbowFitting(FamilyInstance instance)
```

Parameters

instance FamilyInstance

The FamilyInstance to evaluate. This parameter can be [null](#).

Returns

[bool](#)

[true](#) if the **instance** is a mechanical fitting of type tee or elbow; otherwise, [false](#).

Remarks

This method checks if the **instance** has an Autodesk.Revit.DB.MEPModel of type Autodesk.Revit.DB.Mechanical.MechanicalFitting and evaluates its PartType to determine if it is a tee or elbow fitting.

IsWellConnected(FamilyInstance)

Determines whether the specified FamilyInstance is well-connected.

```
public static bool IsWellConnected(FamilyInstance instance)
```

Parameters

instance FamilyInstance

The FamilyInstance to evaluate. This parameter cannot be [null](#).

Returns

[bool](#)

[true](#) if all connectors in the **instance**'s MEP model are connected; otherwise, [false](#). Returns [false](#) if the **instance** or its MEP model is [null](#).

RemoveDuplicateFittings(ref List<FamilyInstance>)

Removes duplicate fittings from the provided list based on proximity and connection criteria.

```
public static void RemoveDuplicateFittings(ref List<FamilyInstance> fittings)
```

Parameters

fittings [List](#)<FamilyInstance>

A reference to the list of FamilyInstance objects representing the fittings. The list will be modified to contain only unique fittings after the method completes.

Remarks

Two fittings are considered duplicates if their positions are within a predefined threshold. When duplicates are found, the method retains the fitting with the most connected connectors, or the first fitting in the group if no fitting is better connected.

SortFittingsByProximity(Document, List<ElementId>, XYZ)

Groups and sorts a list of fitting elements by their proximity to a specified reference point.

```
public static List<List<ElementId>> SortFittingsByProximity(Document doc, List<ElementId> fittingIds, XYZ referencePoint)
```

Parameters

doc Document

The Revit document containing the fitting elements.

fittingIds [List](#)<ElementId>

A list of ElementId objects representing the fittings to be sorted.

referencePoint XYZ

The reference point used to calculate the proximity of each fitting.

Returns

[List](#)<[List](#)<ElementId>>

A list of grouped lists of ElementId objects, where each inner list contains fittings that are within a specified proximity tolerance of each other. The groups are sorted by the distance of their first element to the reference point.

Remarks

The method groups fittings that are within 5 centimeters (0.164 feet) of each other and sorts the groups based on the distance of the first fitting in each group to the reference point. This can be useful for organizing fittings spatially in a Revit model.

Class MbSpaceUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with Autodesk.Revit.DB.Mechanical.Space elements in Autodesk Revit.

```
[LogAspect]  
public static class MbSpaceUtils
```

Inheritance

[object](#) ← MbSpaceUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains static methods to assist in retrieving and manipulating Autodesk.Revit.DB.Mechanical.Space elements from the Revit model, particularly from the user's current selection in the active view.

Methods

GetSpacesFromSelection(UIDocument)

Retrieves a list of Autodesk.Revit.DB.Mechanical.Space elements from the current selection in the Revit UI.

```
public static List<Space> GetSpacesFromSelection(UIDocument uiDoc)
```

Parameters

uiDoc [UIDocument](#)

The UIDocument representing the active Revit document and user interface context.

Returns

List <Space>

A list of Autodesk.Revit.DB.Mechanical.Space elements selected by the user. Returns an empty list if no valid Autodesk.Revit.DB.Mechanical.Space elements are selected.

Remarks

This method filters the current selection to include only valid Autodesk.Revit.DB.Mechanical.Space elements. Invalid or non-Autodesk.Revit.DB.Mechanical.Space elements in the selection are ignored.

Class MbSprinklersUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with sprinkler elements in Revit.

```
[LogAspect]  
public static class MbSprinklersUtils
```

Inheritance

[object](#) ← MbSprinklersUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains methods to assist in identifying and working with Revit elements categorized as sprinklers. It is designed to simplify common operations related to sprinkler elements, such as filtering and casting.

Methods

GetSprinklerInstances(IEnumerable<Element>)

Retrieves all FamilyInstance elements categorized as sprinklers from the provided collection of Revit elements.

```
public static IEnumerable<FamilyInstance> GetSprinklerInstances(IEnumerable<Element>  
selectedElements)
```

Parameters

`selectedElements` [IEnumerable](#)<Element>

A collection of Element objects to search within.

Returns

[IEnumerable](#) <FamilyInstance>

An [IEnumerable<T>](#) containing all elements from `selectedElements` that are categorized as `BuiltInCategory.OST_Sprinklers`.

Remarks

This method filters the input collection to include only elements whose category is "Sprinklers", then casts those elements to FamilyInstance for further use. The filtering logic uses conditional compilation to support different Revit versions.

Class MbUnitUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with measurement units in Revit.

```
[LogAspect]  
public static class MbUnitUtils
```

Inheritance

[object](#) ← MbUnitUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes methods to retrieve and standardize unit symbols for length measurements in the active Revit document. It supports both modern and legacy Revit versions by handling differences in unit type representations.

Methods

GetLengthUnitSymbol()

Retrieves the unit symbol used for length in the active Revit document.

```
public static string GetLengthUnitSymbol()
```

Returns

[string](#)

A string representing the standardized symbol of the length unit (e.g., "mm", "ft", "in", etc.). If the unit type cannot be identified, returns "Unknown".

GetStandardUnitSymbol(object)

Maps Revit unit types to standardized short symbols.

```
public static string GetStandardUnitSymbol(object unitTypeId)
```

Parameters

unitTypeId [object](#)

The unit type identifier, either a ForgeTypeid or DisplayUnitType, depending on Revit version.

Returns

[string](#)

A short string symbol representing the unit (e.g., "mm", "cm", "ft-in"). Returns a user-readable label from Revit's Autodesk.Revit.DB.LabelUtils as a fallback. Returns "Unknown" if mapping cannot be resolved.

Class MbViewUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utility methods for working with Revit views, including graphical view checks, zooming to elements, creating temporary 3D views, and managing view isolation.

```
[LogAspect]  
public static class MbViewUtils
```

Inheritance

[object](#) ← MbViewUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains static methods designed to simplify common operations related to Revit views. It includes functionality for determining view types, manipulating graphical views, and creating or managing temporary 3D views. These utilities are intended to streamline workflows in Revit add-ins and enhance user interaction with views.

Methods

Create3DView(Document)

Creates a new isometric 3D view in the specified document.

```
public static MbResult<View3D> Create3DView(Document doc)
```

Parameters

doc Document

The Revit document in which the 3D view will be created. Cannot be null.

Returns

[MbResult<View3D>](#)

[MbResult<T>](#) containing the result of the operation:

- **Success:** Returns a successful [MbResult<T>](#) containing the newly created Autodesk.Revit.DB.View3D.
- **Failure:** Returns a failed [MbResult<T>](#) with an error message if:
 - No 3D view type is found to copy from.
 - The Autodesk.Revit.DB.ViewFamilyType could not be retrieved.
 - Failure to create the 3D view.

Remarks

This method attempts to create a new isometric 3D view by copying the settings from an existing non-template 3D view in the document. The new view is named "Temp3DMFire" and has its detail level set to ViewDetailLevel.Fine.

EnsureTemp3DViewIsOpen(Document)

Creates and opens the temporary 3D view if it's not already opened in the UI.

```
public static void EnsureTemp3DViewIsOpen(Document activeDoc)
```

Parameters

activeDoc Document

The active document wrapper.

GetAllPlanViews(Document)

Retrieves all non-template plan views from the specified Revit document.

```
public static IList<ViewPlan> GetAllPlanViews(Document doc)
```

Parameters

doc Document

The Revit document from which to retrieve the plan views. Cannot be [null](#).

Returns

[IList](#) <ViewPlan>

A list of Autodesk.Revit.DB.ViewPlan objects representing all non-template plan views in the document. Returns an empty list if no such views are found.

GetAllThreeDViews(Document)

Retrieves all 3D views in the specified Revit document that are not templates.

```
public static List<View3D> GetAllThreeDViews(Document doc)
```

Parameters

doc Document

The Revit document from which to retrieve the 3D views. Cannot be [null](#).

Returns

[List](#) <View3D>

A list of Autodesk.Revit.DB.View3D objects representing all non-template 3D views in the document. Returns an empty list if no such views are found.

GetOrCreateTemp3D(Document)

Retrieves an existing 3D view named "Temp3DMBFire" from the specified document, or creates a new one if it does not exist.

```
public static MbResult<View3D> GetOrCreateTemp3D(Document doc)
```

Parameters

doc Document

The Autodesk.Revit.DB.Document from which to retrieve or create the 3D view. This parameter cannot be [null](#).

Returns

[MbResult<View3D>](#)

A [MbResult<T>](#) containing the 3D view. If a view named "Temp3DMFire" exists, it is returned; otherwise, a new 3D view is created and returned.

Remarks

This method first searches for an existing 3D view with the name "Temp3DMFire". If found, it returns the existing view wrapped in a successful [MbResult<T>](#). If no such view exists, a new 3D view is created and returned.

GetTemp3DNoTransaction(Document)

Retrieves a temporary 3D view for the specified document without initiating a transaction.

```
public static MbResult<View3D> GetTemp3DNoTransaction(Document doc)
```

Parameters

doc Document

The document for which the temporary 3D view is to be retrieved or created. Cannot be null.

Returns

[MbResult<View3D>](#)

A [MbResult<T>](#) containing the temporary 3D view if successful, or an error result if the operation fails.

IsGraphicalView(View)

Determines whether the specified Autodesk.Revit.DB.View represents a graphical view.

```
public static bool IsGraphicalView(View view)
```

Parameters

view View

The Autodesk.Revit.DB.View to evaluate. Must not be [null](#).

Returns

[bool](#)

[true](#) if the [view](#) is a graphical view, such as a floor plan, section, or 3D view; otherwise, [false](#).

Remarks

Graphical views include types such as floor plans, ceiling plans, sections, elevations, 3D views, drafting views, area plans, engineering plans, details, and legends. Non-graphical views include schedules, reports, and undefined views.

ResetTemporaryIsolate()

Resets the temporary isolate mode for the active view, if it is currently enabled.

```
public static void ResetTemporaryIsolate()
```

Remarks

This method checks if the active view has temporary isolate mode enabled and, if so, disables it. If no active view exists or temporary isolate mode is not active, the method performs no action.

TemporarilyIsolateElement(Element)

Temporarily isolates the specified element in the active graphical view.

```
public static bool TemporarilyIsolateElement(Element element)
```

Parameters

[element](#) Element

The element to isolate. Must belong to the document of the active view.

Returns

[bool](#)

`true` if the element was successfully isolated; otherwise, `false`.

Remarks

This method isolates the specified element temporarily in the active view of the document. Isolation is only supported in graphical views. If the active view is not graphical, the method displays a warning message and returns `false`. If an error occurs during the isolation process, an error message is displayed, and the method returns `false`.

ZoomToElement(Element)

Zooms and centers the active view on the specified element's bounding box.

```
public static void ZoomToElement(Element element)
```

Parameters

element Element

The element to zoom to. Must belong to the active document and have a valid bounding box in the active view.

Remarks

This method adjusts the active view to focus on the bounding box of the specified element. If the bounding box cannot be retrieved or the active view is not a graphical view (e.g., plan, 3D view, section, or legend), an error message is displayed, and no action is taken. The method also optionally selects the element in the active view.

ZoomToElement(ElementId)

Zooms and centers the active view on the specified element by its ElementId.

```
public static void ZoomToElement(ElementId elementId)
```

Parameters

elementId ElementId

The ElementId of the element to zoom to. Must belong to the active document.

Remarks

This method adjusts the active view to focus on the bounding box of the specified element. If the bounding box cannot be retrieved, an error message is displayed. The method works only in graphical views such as plan, 3D, section, or legend views. If the active view is not a supported graphical view, an error message is displayed.

ZoomToElement(FamilyInstance)

Zooms and centers the active view on the specified FamilyInstance element.

```
public static void ZoomToElement(FamilyInstance instance)
```

Parameters

instance FamilyInstance

The FamilyInstance to zoom to. Must belong to the active document.

Remarks

This method adjusts the active view to focus on the bounding box of the specified element. If the bounding box cannot be retrieved, an error message is displayed. The method works only in graphical views such as plan, 3D, section, or legend views. If the active view is not a supported graphical view, an error message is displayed.

Enum PipePointType

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Represents a specific point along a pipe, either at the start or the end.

```
public enum PipePointType
```

Fields

End = 1

Refers to the end point of the pipe geometry. Equivalent to `pipe.get_EndPoint(1)`.

Start = 0

Refers to the start point of the pipe geometry. Equivalent to `pipe.get_EndPoint(0)`.

Class RevitUnitUtils

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Determines whether the units of the specified Revit document are metric.

```
[LogAspect]  
public static class RevitUnitUtils
```

Inheritance

[object](#) ← RevitUnitUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This method checks the length unit settings of the provided Revit document to determine if they are configured to use metric units. Metric units include meters, centimeters, and millimeters.

Methods

IsMetric(Document)

Determines whether the specified document uses metric units for length measurements.

```
public static bool IsMetric(this Document doc)
```

Parameters

doc Document

The document to evaluate.

Returns

[bool](#)

[true](#) if the document uses metric units such as meters, centimeters, or millimeters; otherwise, [false](#).

Class XyzExtensibleStorage

Namespace: [MBF.Revit.Data.Utils](#)

Assembly: MBF.Revit.Data.dll

Provides utilities for reading and writing Autodesk.Revit.DB.XYZ start point data for Autodesk.Revit.DB.Plumbing.Pipe elements using Revit's Extensible Storage API.

```
[LogAspect]  
public static class XyzExtensibleStorage
```

Inheritance

[object](#) ← XyzExtensibleStorage

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GetEntityValue(Entity, Field)

Retrieves the value of the specified field from the given entity as an Autodesk.Revit.DB.XYZ object.

```
public static XYZ GetEntityValue(Entity entity, Field field)
```

Parameters

entity Entity

The Autodesk.Revit.DB.ExtensibleStorage.Entity from which the field value is retrieved. Cannot be [null](#).

.

field Field

The Autodesk.Revit.DB.ExtensibleStorage.Field that specifies the data to retrieve. Cannot be [null](#).

Returns

XYZ

An Autodesk.Revit.DB.XYZ object representing the value of the specified field in the entity.

Remarks

The method retrieves the value using the appropriate unit system based on the Revit version. For Revit 2021 or later, the method uses a unit system derived from the Autodesk.Revit.DB.SpecTypeId.Length specification. For earlier versions, it defaults to DisplayUnitType.DUT_FEET_FRACTIONAL_INCHES.

GetNearestEndPoints(Pipe)

Retrieves the endpoints of the specified pipe's location curve.

```
public static List<XYZ> GetNearestEndPoints(this Pipe pipe)
```

Parameters

pipe Pipe

The pipe whose endpoints are to be retrieved. Must have a valid location curve.

Returns

[List](#) <XYZ>

A list of Autodesk.Revit.DB.XYZ objects representing the start and end points of the pipe's location curve. If the pipe does not have a location curve, an empty list is returned.

Remarks

This method assumes the pipe's location is a Autodesk.Revit.DB.LocationCurve. If the location is not a Autodesk.Revit.DB.LocationCurve, the method will return an empty list without throwing an exception.

GetNearestEndPoints(Pipe, XYZ)

Returns the pipe's endpoints sorted by proximity to a given point.

```
public static List<XYZ> GetNearestEndPoints(this Pipe p, XYZ referencePoint)
```

Parameters

p Pipe

The pipe.

referencePoint XYZ

The point to compare against.

Returns

[List](#) <XYZ>

List of endpoints with the nearest one first.

ReadStartPoint(Pipe)

Retrieves the stored start point of the given Autodesk.Revit.DB.Plumbing.Pipe, if available and valid.

```
public static XYZ ReadStartPoint(Pipe pipe)
```

Parameters

pipe Pipe

The pipe from which to retrieve the stored Autodesk.Revit.DB.XYZ start point.

Returns

XYZ

The nearest endpoint to the stored start point if valid and close to the actual pipe ends; otherwise, **null**.

SetStartPoint(Pipe, XYZ, string)

Sets the start point of a pipe in extensible storage, choosing the nearest pipe endpoint. Skips overwriting if already set by another tool, unless the caller is explicitly allowed.

```
public static void SetStartPoint(Pipe pipe, XYZ startPoint, string caller = null)
```

Parameters

pipe Pipe

The pipe to set the start point for.

startPoint XYZ

The picked point by the user.

caller string ↗

The name of the calling method, used to control write permissions.

Namespace MBF.Revit.Geometry.Extensions

Classes

[BoundingBoxExtensions](#)

Provides extension methods for working with Autodesk.Revit.DB.BoundingBoxXYZ objects.

[BoundingBoxVisualizerExtensions](#)

Provides extension methods for visualizing bounding boxes as 2D outlines in a Revit document.

[ClipperExtensions](#)

Provides extension methods for working with Clipper2Lib.PathsD and Clipper2Lib.PathD collections, as well as converting Clipper2Lib.PathD objects to Revit CurveLoop instances.

[CurveLoopExtensions](#)

Provides extension methods for converting CurveLoop objects into Clipper-compatible path representations, such as Clipper2Lib.PathD and Clipper2Lib.PathsD.

[CurveLoopVisualizerExtensions](#)

Provides extension methods for visualizing and creating Revit elements from CurveLoop objects.

[CurveVisualizerExtensions](#)

Provides extension methods for visualizing Autodesk.Revit.DB.Curve instances as 2D geometry in Revit, either using DirectShape elements in model views or Autodesk.Revit.DB.DetailCurve elements in drafting views.

[DirectShapeVisualization](#)

Provides methods for creating and managing DirectShape elements in a Revit document.

[PathDVisualizerExtensions](#)

Provides extension methods for visualizing Clipper2Lib.PathD and Clipper2Lib.PathsD objects as 2D outlines in a Revit document using DirectShape elements.

[XyzVisualizationsExtensions](#)

Provides extension methods for visualizing Autodesk.Revit.DB.XYZ points as 3D objects in a Revit document.

Class BoundingBoxExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for working with Autodesk.Revit.DB.BoundingBoxXYZ objects.

```
[LogAspect]  
public static class BoundingBoxExtensions
```

Inheritance

[object](#) ← BoundingBoxExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes methods to convert Autodesk.Revit.DB.BoundingBoxXYZ instances into other geometric representations, such as CurveLoop objects, for use in various geometric and modeling operations.

Methods

ToCurveLoop(BoundingBoxXYZ)

Converts a Autodesk.Revit.DB.BoundingBoxXYZ into a closed rectangular CurveLoop in the XY plane.

```
public static MbResult<CurveLoop> ToCurveLoop(this BoundingBoxXYZ boundingBox)
```

Parameters

boundingBox BoundingBoxXYZ

The bounding box to convert.

Returns

[MbResult](#)<CurveLoop>

An [MbResult<T>](#):

- **Success:** Contains the rectangular CurveLoop.
- **Failure:** "BoundingBoxXYZ is null."
- **Failure:** "Failed to convert BoundingBoxXYZ to CurveLoop: [exception message]"

Class BoundingBoxVisualizerExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for visualizing bounding boxes as 2D outlines in a Revit document.

```
[LogAspect]  
public static class BoundingBoxVisualizerExtensions
```

Inheritance

[object](#) ← BoundingBoxVisualizerExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes methods to visualize single or multiple bounding boxes as 2D shapes in the specified Revit document. The visualizations are created as red outlines by default, but an optional color can be specified.

Methods

VisualizeBoundingBox2D(BoundingBoxXYZ, Document, Color)

Visualizes a 2D representation of the specified Autodesk.Revit.DB.BoundingBoxXYZ in the given Revit document.

```
public static void VisualizeBoundingBox2D(this BoundingBoxXYZ boundingBox, Document doc,  
Color color = null)
```

Parameters

boundingBox BoundingBoxXYZ

The 2D bounding box to visualize. Cannot be [null](#).

doc Document

The Revit document where the bounding box will be visualized. Cannot be [null](#).

color Color

The color to use for the visualization. If [null](#), the default color is red (RGB: 255, 0, 0).

Remarks

This method creates a 2D visualization of the bounding box as a direct shape in the specified document. The visualization is created within a transaction, which is started and committed by this method.

VisualizeBoundingBoxes2D(IEnumerable<BoundingBoxXYZ>, Document, Color)

Visualizes a collection of 2D bounding boxes in the specified Revit document.

```
public static void VisualizeBoundingBoxes2D(this IEnumerable<BoundingBoxXYZ> boundingBoxes, Document doc, Color color = null)
```

Parameters

boundingBoxes [IEnumerable](#)<BoundingBoxXYZ>

A collection of Autodesk.Revit.DB.BoundingBoxXYZ objects representing the 2D bounding boxes to visualize.

doc Document

The Autodesk.Revit.DB.Document in which the bounding boxes will be visualized. This cannot be [null](#).

color Color

An optional Autodesk.Revit.DB.Color to use for the bounding box visualization. If not specified, the default color is red (RGB: 255, 0, 0).

Remarks

This method creates 2D visual representations of the provided bounding boxes as direct shapes in the Revit document. If a bounding box in the collection is [null](#), it will be skipped.

Class ClipperExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for working with Clipper2Lib.PathsD and Clipper2Lib.PathD collections, as well as converting Clipper2Lib.PathD objects to Revit CurveLoop instances.

```
[LogAspect]  
public static class ClipperExtensions
```

Inheritance

[object](#) ← ClipperExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes utility methods for manipulating Clipper paths and integrating them with Revit geometry.

Methods

AddPathDToPathsD(PathsD, PathD)

Adds a single Clipper2Lib.PathD to an existing Clipper2Lib.PathsD collection.

```
public static PathsD AddPathDToPathsD(this PathsD pathsD, PathD pathD)
```

Parameters

pathsD PathsD

The Clipper2Lib.PathsD collection to which the path will be added.

pathD PathD

The Clipper2Lib.PathD to add.

Returns

PathsD

The updated Clipper2Lib.PathsD collection containing the added path.

ToCurveLoop(PathD)

Converts a Clipper2Lib.PathD into a Revit CurveLoop by connecting its points with lines.

```
public static MbResult<CurveLoop> ToCurveLoop(this PathD pathD)
```

Parameters

pathD PathD

The Clipper path to convert.

Returns

[MbResult<CurveLoop>](#)

An [MbResult<T>](#):

- **Success:** Contains the resulting CurveLoop.
- **Failure:** "PathD is null."
- **Failure:** "PathD must contain at least two points to create a CurveLoop."
- **Failure:** "Failed to convert PathD to CurveLoop: [exception message]"

Class CurveLoopExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for converting CurveLoop objects into Clipper-compatible path representations, such as Clipper2Lib.PathD and Clipper2Lib.PathsD.

```
[LogAspect]
public static class CurveLoopExtensions
```

Inheritance

[object](#) ← CurveLoopExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

These methods facilitate the conversion of geometric curve data into formats compatible with the Clipper library, enabling operations such as polygon clipping and path manipulation. The methods handle common validation scenarios, such as ensuring the input is not null and that the geometry meets the minimum requirements for conversion.

Methods

ToClipperPathD(CurveLoop)

Converts a CurveLoop into a Clipper-compatible Clipper2Lib.PathD by collecting its curve endpoints.

```
public static MbResult<PathD> ToClipperPathD(this CurveLoop curveLoop)
```

Parameters

curveLoop CurveLoop

The CurveLoop to convert.

Returns

[MbResult<PathD>](#)

An [MbResult<T>](#):

- **Success:** Contains the converted Clipper2Lib.PathD.
- **Failure:** "CurveLoop is null."
- **Failure:** "The CurveLoop must have at least 3 points to form a polygon."
- **Failure:** "Failed to convert CurveLoop to PathD: [exception message]"

ToClipperPathsD(IEnumerable<CurveLoop>)

Converts a collection of CurveLoop objects into a Clipper-compatible Clipper2Lib.PathsD.

```
public static MbResult<PathsD> ToClipperPathsD(this IEnumerable<CurveLoop> curveLoops)
```

Parameters

`curveLoops` [IEnumerable<CurveLoop>](#)

The CurveLoop collection to convert.

Returns

[MbResult<PathsD>](#)

An [MbResult<T>](#):

- **Success:** Contains the converted Clipper2Lib.PathsD.
- **Failure:** "CurveLoop collection is null."
- **Failure:** Any error from [ToClipperPathD\(CurveLoop\)](#) such as "CurveLoop is null." or invalid geometry.
- **Failure:** "Failed to convert CurveLoops to PathsD: [exception message]"

ToPathsD(CurveLoop)

Wraps a single CurveLoop into a Clipper2Lib.PathsD collection.

```
public static MbResult<PathsD> ToPathsD(this CurveLoop curveLoop)
```

Parameters

`curveLoop` CurveLoop

The CurveLoop to wrap.

Returns

[MbResult<PathsD>](#)

An [MbResult<T>](#):

- **Success:** Contains a Clipper2Lib.PathsD with one converted path.
- **Failure:** Any error from [ToClipperPathD\(CurveLoop\)](#), such as null or invalid geometry.

Class CurveLoopVisualizerExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for visualizing and creating Revit elements from CurveLoop objects.

```
[LogAspect]
public static class CurveLoopVisualizerExtensions
```

Inheritance

[object](#) ← CurveLoopVisualizerExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes methods for creating 2D visualizations of CurveLoop objects using DirectShape elements and for generating Autodesk.Revit.DB.DetailCurve elements in drafting views. These methods are designed to work with the active view of a Revit document and provide optional customization, such as specifying outline colors.

Methods

CreateCurveLoopWithDetailCurves(CurveLoop, Document, ViewDrafting, Color)

Creates Autodesk.Revit.DB.DetailCurve elements in a Autodesk.Revit.DB.ViewDrafting to represent the given CurveLoop.

```
public static MbResult<List<DetailCurve>> CreateCurveLoopWithDetailCurves(this CurveLoop
curveLoop, Document doc, ViewDrafting draftingView, Color color = null)
```

Parameters

curveLoop CurveLoop

The CurveLoop to draw.

doc Document

The current Revit document.

draftingView ViewDrafting

The drafting view where detail curves will be placed.

color Color

Optional line color; defaults to red if not provided.

Returns

[MbResult<List<DetailCurve>>](#)

An [MbResult<T>](#) where **T** is [List<T>](#):

- **Success:** Contains the created list of Autodesk.Revit.DB.DetailCurve elements.
- **Failure:** "CurveLoop is null."
- **Failure:** "Document or drafting view is null."
- **Failure:** "Failed to create detail curves: [exception message]"

VisualizeCurveLoop2D(CurveLoop, Document, Color)

Visualizes a single CurveLoop as a 2D outline using a DirectShape element in the active view of the given Revit **doc**.

```
public static MbResult<DirectShape> VisualizeCurveLoop2D(this CurveLoop curveLoop, Document doc, Color color = null)
```

Parameters

curveLoop CurveLoop

The CurveLoop to visualize.

doc Document

The current Revit document containing the active view.

color Color

Optional outline color; defaults to red if not provided.

Returns

[MbResult](#)<DirectShape>

An [MbResult<T>](#):

- **Success:** Contains the created DirectShape.
- **Failure:** "CurveLoop is null."
- **Failure:** "Document or active view is null."
- **Failure:** "Failed to visualize CurveLoop: [exception message]"

VisualizeCurveLoops2D(IEnumerable<CurveLoop>, Document, Color)

Visualizes a list of CurveLoop objects as 2D outlines using DirectShape elements in the active view of the given Revit [doc](#).

```
public static MbResult<List<DirectShape>> VisualizeCurveLoops2D(this IEnumerable<CurveLoop> curveLoops, Document doc, Color color = null)
```

Parameters

[curveLoops](#) [IEnumerable](#)<CurveLoop>

The collection of CurveLoop instances to visualize.

[doc](#) Document

The current Revit document containing the active view.

[color](#) Color

Optional outline color; defaults to red if not provided.

Returns

[MbResult](#)<[List](#)<DirectShape>>

An [MbResult<T>](#) where [T](#) is [List<T>](#):

- **Success:** Contains a list of created DirectShape elements.
- **Failure:** "CurveLoop collection is null."

- **Failure:** "Document or active view is null."
- **Failure:** "Failed to visualize multiple CurveLoops: [exception message]"

Class CurveVisualizerExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for visualizing Autodesk.Revit.DB.Curve instances as 2D geometry in Revit, either using DirectShape elements in model views or Autodesk.Revit.DB.DetailCurve elements in drafting views.

```
[LogAspect]  
public static class CurveVisualizerExtensions
```

Inheritance

[object](#) ← CurveVisualizerExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

CreateCurveWithDetailCurve(Curve, Document, ViewDrafting, Color)

Creates a Autodesk.Revit.DB.DetailCurve element in a Autodesk.Revit.DB.ViewDrafting to represent the given Autodesk.Revit.DB.Curve.

```
public static MbResult<DetailCurve> CreateCurveWithDetailCurve(this Curve curve, Document  
doc, ViewDrafting draftingView, Color color = null)
```

Parameters

curve Curve

The Autodesk.Revit.DB.Curve to draw.

doc Document

The current Revit document.

`draftingView` ViewDrafting

The drafting view where the detail curve will be placed.

`color` Color

Optional line color; defaults to red if not provided.

Returns

[MbResult<DetailCurve>](#)

An [MbResult<T>](#):

- **Success:** Contains the created Autodesk.Revit.DB.DetailCurve element.
- **Failure:** "Curve is null."
- **Failure:** "Document or drafting view is null."
- **Failure:** "Failed to create detail curve: [exception message]"

VisualizeCurve2D(Curve, Document, Color)

Visualizes a single Autodesk.Revit.DB.Curve as 2D geometry using a DirectShape element in the active view of the given Revit `doc`.

```
public static MbResult<DirectShape> VisualizeCurve2D(this Curve curve, Document doc, Color  
color = null)
```

Parameters

`curve` Curve

The Autodesk.Revit.DB.Curve to visualize.

`doc` Document

The current Revit document containing the active view.

`color` Color

Optional outline color; defaults to red if not provided.

Returns

[MbResult<DirectShape>](#)

An [MbResult<T>](#):

- **Success:** Contains the created DirectShape element.
- **Failure:** "Curve is null."
- **Failure:** "Document or active view is null."
- **Failure:** "Failed to visualize curve: [exception message]"

VisualizeCurves2D(IEnumerable<Curve>, Document, Color)

Visualizes a list of Autodesk.Revit.DB.Curve instances as 2D outlines using DirectShape elements in the active view of the given Revit [doc](#).

```
public static MbResult<List<DirectShape>> VisualizeCurves2D(this IEnumerable<Curve> curves,  
Document doc, Color color = null)
```

Parameters

[curves](#) [IEnumerable](#)<Curve>

The collection of Autodesk.Revit.DB.Curve instances to visualize.

[doc](#) Document

The current Revit document containing the active view.

[color](#) Color

Optional outline color; defaults to red if not provided.

Returns

[MbResult](#)<[List](#)<DirectShape>>

An [MbResult<T>](#) where T is [List<T>](#):

- **Success:** Contains a list of created DirectShape elements.
- **Failure:** "Curve collection is null."
- **Failure:** "Document or active view is null."
- **Failure:** "Failed to visualize curves: [exception message]"

Class DirectShapeVisualization

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides methods for creating and managing DirectShape elements in a Revit document.

```
[LogAspect]  
public static class DirectShapeVisualization
```

Inheritance

[object](#) ← DirectShapeVisualization

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes utility methods for generating geometric shapes, such as spheres, and placing them in the Revit model as DirectShape elements. These methods facilitate the creation of reusable shape types and instances, leveraging Revit's geometry creation utilities.

Methods

CreateSphere(Document, XYZ, double)

Creates a spherical DirectShape element in the Revit document using revolved geometry.

```
public static DirectShape CreateSphere(Document doc, XYZ center, double radius)
```

Parameters

doc Document

The active Revit document where the shape will be created.

center XYZ

The center point of the sphere in model coordinates.

`radius` `double`

The radius of the sphere in Revit units (feet).

Returns

`DirectShape`

A `DirectShape` element representing the sphere, or `null` if the geometry could not be defined due to an invalid frame.

Class PathDVisualizerExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for visualizing Clipper2Lib.PathD and Clipper2Lib.PathsD objects as 2D outlines in a Revit document using DirectShape elements.

```
[LogAspect]  
public static class PathDVisualizerExtensions
```

Inheritance

[object](#) ← PathDVisualizerExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

These methods allow developers to create visual representations of 2D paths in the active view of a Revit document. The visualizations are rendered as outlines on the XY plane and can be customized with an optional color parameter.

Methods

VisualizePathD2D(PathD, Document, Color)

Visualizes a single Clipper2Lib.PathD as a 2D outline using a DirectShape in the active view of the specified Revit document.

```
public static void VisualizePathD2D(this PathD path, Document doc, Color color = null)
```

Parameters

path PathD

The Clipper2Lib.PathD to visualize in 2D (XY plane).

doc Document

The Revit Autodesk.Revit.DB.Document where the path will be visualized.

color Color

Optional color for the path outline. Defaults to red if not specified.

VisualizePathsD2D(PathsD, Document, Color)

Visualizes each Clipper2Lib.PathD in a Clipper2Lib.PathsD collection as a 2D outline using DirectShape elements.

```
public static void VisualizePathsD2D(this PathsD paths, Document doc, Color color = null)
```

Parameters

paths PathsD

The Clipper2Lib.PathsD collection to visualize in 2D (XY plane).

doc Document

The Revit Autodesk.Revit.DB.Document where the paths will be visualized.

color Color

Optional color for the path outlines. Defaults to red if not specified.

Class XyzVisualizationsExtensions

Namespace: [MBF.Revit.Geometry.Extensions](#)

Assembly: MBF.Revit.Geometry.dll

Provides extension methods for visualizing Autodesk.Revit.DB.XYZ points as 3D objects in a Revit document.

```
[LogAspect]
public static class XyzVisualizationsExtensions
```

Inheritance

[object](#) ← XyzVisualizationsExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

These methods allow users to create visual representations of Autodesk.Revit.DB.XYZ points in the active view of a Revit document. The visualizations are implemented using DirectShape elements, with optional color customization.

Methods

VisualizePoint(XYZ, Document, Color)

Visualizes an Autodesk.Revit.DB.XYZ point as a 3D point object using a DirectShape in the active view.

```
public static void VisualizePoint(this XYZ point, Document doc, Color color = null)
```

Parameters

point XYZ

The point to visualize.

doc Document

The Revit document where the shape will be created.

color Color

Optional color override. Defaults to red if null.

VisualizePointAsElement(XYZ, Document, Color)

Visualizes an Autodesk.Revit.DB.XYZ point as a 3D geometry using a DirectShape element in the active view, and returns the created element wrapped in [MbResult<T>](#).

```
public static MbResult<Element> VisualizePointAsElement(this XYZ point, Document doc, Color  
color = null)
```

Parameters

point XYZ

The point to visualize.

doc Document

The Revit document where the shape will be created.

color Color

Optional color override. Defaults to red if not specified.

Returns

[MbResult<Element>](#)

A [MbResult<T>](#):

- **Success:** The created DirectShape element.
- **Failure:** "Point, document, or active view is null."
- **Failure:** "Exception: [message]"

Namespace MBF.Revit.Geometry.Utils

Classes

[MbXyzUtils](#)

Provides utility methods for working with 2D geometry, including operations on polygons and line segments.

[PolygonUtils](#)

Provides utility methods for working with 2D polygons in the XY plane.

Class MbXyzUtils

Namespace: [MBF.Revit.Geometry.Utils](#)

Assembly: MBF.Revit.Geometry.dll

Provides utility methods for working with 2D geometry, including operations on polygons and line segments.

```
[LogAspect]  
public static class MbXyzUtils
```

Inheritance

[object](#) ← MbXyzUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes methods for detecting self-intersections in polygons, determining line segment intersections, and sorting points in a clockwise order. It is designed to work with 2D geometry represented by Autodesk.Revit.DB.XYZ points, where the Z-coordinate is ignored in calculations.

Methods

DoLinesIntersect2D(Line, Line)

Determines whether two Revit Autodesk.Revit.DB.Line objects intersect in 2D (ignoring Z).

```
public static bool DoLinesIntersect2D(Line line1, Line line2)
```

Parameters

line1 Line

First line.

line2 Line

Second line.

Returns

[bool](#)

[true](#) if the lines intersect in 2D; otherwise, [false](#).

DoLinesIntersect2D(XYZ, XYZ, XYZ, XYZ)

Determines whether two line segments in 2D space intersect.

```
public static bool DoLinesIntersect2D(XYZ segment1Start, XYZ segment1End, XYZ segment2Start,  
XYZ segment2End)
```

Parameters

segment1Start XYZ

The starting point of the first line segment.

segment1End XYZ

The ending point of the first line segment.

segment2Start XYZ

The starting point of the second line segment.

segment2End XYZ

The ending point of the second line segment.

Returns

[bool](#)

[true](#) if the two line segments intersect; otherwise, [false](#).

Remarks

This method uses a counter-clockwise orientation test to determine if the line segments intersect. The segments are considered to intersect if they share any point in common, including endpoints.

HasSelfIntersections(List<XYZ>)

Determines whether a list of Autodesk.Revit.DB.XYZ points forming a polygon has any self-intersections.

```
public static bool HasSelfIntersections(List<XYZ> points)
```

Parameters

points [List](#)<XYZ>

A list of points representing the polygon vertices in order.

Returns

[bool](#)

true if any two non-adjacent edges of the polygon intersect; otherwise, **false**.

Remarks

The method performs three checks:

1. Checks all non-adjacent segment pairs within the polygon to detect internal intersections.
2. Checks if the most recently added segment intersects any existing (non-adjacent) segment.
3. Checks if the closing segment (from the last point to the first) intersects any interior segment (excluding adjacent ones).

SortPointsClockwise(List<XYZ>)

Sorts a list of Autodesk.Revit.DB.XYZ points in clockwise order around their centroid (in 2D plane).

```
public static List<XYZ> SortPointsClockwise(List<XYZ> points)
```

Parameters

points [List](#)<XYZ>

The list of points to sort.

Returns

[List](#)<XYZ>

A new list of points sorted clockwise.

Class PolygonUtils

Namespace: [MBF.Revit.Geometry.Utils](#)

Assembly: MBF.Revit.Geometry.dll

Provides utility methods for working with 2D polygons in the XY plane.

```
[LogAspect]  
public static class PolygonUtils
```

Inheritance

[object](#) ← PolygonUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class includes methods for determining spatial relationships between points and polygons, such as checking whether a point lies inside a polygon. All calculations are performed in the XY plane, and Z-values of input points are ignored.

Methods

IsPointInsidePolygon(List<XYZ>, XYZ)

Determines whether a given point lies inside a 2D polygon using the ray-casting algorithm (in XY plane).

```
public static MbResult<bool> IsPointInsidePolygon(List<XYZ> polygon, XYZ point)
```

Parameters

polygon [List](#)<XYZ>

The list of polygon vertices (at least 3 points required). Z-values are ignored.

point XYZ

The point to check. Z-value is ignored.

Returns

[MbResult<bool>](#)

An [MbResult<T>](#) containing:

- `true` if the point lies inside the polygon.
- `false` if the point lies outside or on the edge.
- An error message if the input is invalid or an exception occurs.

Namespace MBF.Revit.Geometry.Voronoi.Models

Classes

[Edge](#)

Represents an edge in the Voronoi diagram, defined by a line equation and associated sites.

[GraphEdge](#)

Represents a graphical edge in the Voronoi diagram, defined by two endpoints and the indices of the two sites it separates.

[Halfedge](#)

Represents a half-edge in the Voronoi diagram, used primarily in Fortune's algorithm for managing the beach line and event queue.

[Point](#)

Represents a point in 2D space.

[Site](#)

Represents a site (or generator point) used in the Voronoi diagram, typically associated with a cell in the diagram.

[SiteSorterYX](#)

Provides a comparison mechanism for sorting [Site](#) instances. Sorts first by Y-coordinate, then by X-coordinate if Y values are equal. Useful for processing sites in Fortune's algorithm.

[Voronoi](#)

Represents a Voronoi diagram generator.

Class Edge

Namespace: [MBF.Revit.Geometry.Voronoi.Models](#)

Assembly: MBF.Revit.Geometry.dll

Represents an edge in the Voronoi diagram, defined by a line equation and associated sites.

```
public class Edge
```

Inheritance

[object](#) ← Edge

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

Edge()

Initializes a new instance of the [Edge](#) class.

```
public Edge()
```

Fields

A

Coefficient 'a' in the line equation of the edge ($a * x + b * y = c$).

```
public double A
```

Field Value

[double](#)

B

Coefficient 'b' in the line equation of the edge ($a * x + b * y = c$).

```
public double B
```

Field Value

[double](#)

C

Constant term 'c' in the line equation of the edge ($a * x + b * y = c$).

```
public double C
```

Field Value

[double](#)

Edgenbr

Unique identifier for the edge.

```
public int Edgenbr
```

Field Value

[int](#)

Ep

Endpoints of the edge (can be null if the edge is a ray or still under construction).

```
public Site[] Ep
```

Field Value

[Site\[\]](#)

Reg

Sites that the edge bisects; these are the two sites whose Voronoi cells are separated by this edge.

```
public Site[] Reg
```

Field Value

[Site\[\]](#)

Class GraphEdge

Namespace: [MBF.Revit.Geometry.Voronoi.Models](#)

Assembly: MBF.Revit.Geometry.dll

Represents a graphical edge in the Voronoi diagram, defined by two endpoints and the indices of the two sites it separates.

```
public class GraphEdge
```

Inheritance

[object](#) ← GraphEdge

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

GraphEdge()

```
public GraphEdge()
```

Fields

site1

The index of the first site that this edge separates.

```
public int site1
```

Field Value

[int](#)

site2

The index of the second site that this edge separates.

```
public int site2
```

Field Value

[int](#)

x1

The X-coordinate of the starting point of the edge.

```
public double x1
```

Field Value

[double](#)

x2

The X-coordinate of the ending point of the edge.

```
public double x2
```

Field Value

[double](#)

y1

The Y-coordinate of the starting point of the edge.

```
public double y1
```

Field Value

[double](#)

y2

The Y-coordinate of the ending point of the edge.

```
public double y2
```

Field Value

[double](#)

Class Halfedge

Namespace: [MBF.Revit.Geometry.Voronoi.Models](#)

Assembly: MBF.Revit.Geometry.dll

Represents a half-edge in the Voronoi diagram, used primarily in Fortune's algorithm for managing the beach line and event queue.

```
public class Halfedge
```

Inheritance

[object](#) ← Halfedge

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

Halfedge()

Initializes a new instance of the [Halfedge](#) class.

```
public Halfedge()
```

Fields

ELedge

The edge associated with this half-edge.

```
public Edge ELedge
```

Field Value

[Edge](#)

ELleft

The left neighboring half-edge in the edge list.

```
public Halfedge ELleft
```

Field Value

[Halfedge](#)

ELpm

Side indicator: 0 for left, 1 for right. Determines which region the half-edge belongs to.

```
public int ELpm
```

Field Value

[int↗](#)

ELright

The right neighboring half-edge in the edge list.

```
public Halfedge ELright
```

Field Value

[Halfedge](#)

PQnext

The next half-edge in the priority queue.

```
public Halfedge PQnext
```

Field Value

[Halfedge](#)

deleted

Indicates whether this half-edge has been marked for deletion.

```
public bool deleted
```

Field Value

[bool](#) ↗

vertex

The vertex where this half-edge ends (used in the priority queue for upcoming events).

```
public Site vertex
```

Field Value

[Site](#)

ystar

The Y-coordinate of the event associated with this half-edge in the priority queue.

```
public double ystar
```

Field Value

[double](#) ↗

Class Point

Namespace: [MBF.Revit.Geometry.Voronoi.Models](#)

Assembly: MBF.Revit.Geometry.dll

Represents a point in 2D space.

```
public class Point
```

Inheritance

[object](#) ← Point

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

Point()

Initializes a new instance of the [Point](#) class.

```
public Point()
```

Fields

X

The x-coordinate of the point.

```
public double x
```

Field Value

[double](#)

y

The y-coordinate of the point.

```
public double y
```

Field Value

[double](#)

Methods

SetPoint(double, double)

Sets the coordinates of the point.

```
public void SetPoint(double x, double y)
```

Parameters

x [double](#)

The x-coordinate.

y [double](#)

The y-coordinate.

Class Site

Namespace: [MBF.Revit.Geometry.Voronoi.Models](#)

Assembly: MBF.Revit.Geometry.dll

Represents a site (or generator point) used in the Voronoi diagram, typically associated with a cell in the diagram.

```
public class Site
```

Inheritance

[object](#) ← Site

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

Site()

Initializes a new instance of the [Site](#) class.

```
public Site()
```

Fields

coord

The coordinates of the site in 2D space.

```
public Point coord
```

Field Value

[Point](#)

sitenbr

A unique identifier for the site.

```
public int sitenbr
```

Field Value

[int ↗](#)

Class SiteSorterYX

Namespace: [MBF.Revit.Geometry.Voronoi.Models](#)

Assembly: MBF.Revit.Geometry.dll

Provides a comparison mechanism for sorting [Site](#) instances. Sorts first by Y-coordinate, then by X-coordinate if Y values are equal. Useful for processing sites in Fortune's algorithm.

```
public class SiteSorterYX : IComparer<Site>
```

Inheritance

[object](#) ← SiteSorterYX

Implements

[IComparer](#) <[Site](#)>

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

SiteSorterYX()

```
public SiteSorterYX()
```

Methods

Compare(Site, Site)

Compares two [Site](#) objects based on their Y and X coordinates.

```
public int Compare(Site p1, Site p2)
```

Parameters

p1 Site

The first site to compare.

p2 Site

The second site to compare.

Returns

int ↗

-1 if **p1** comes before **p2**, 1 if it comes after, 0 if they are equal.

Class Voronoi

Namespace: [MBF.Revit.Geometry.Voronoi.Models](#)

Assembly: MBF.Revit.Geometry.dll

Represents a Voronoi diagram generator.

```
public class Voronoi
```

Inheritance

[object](#) ← Voronoi

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

Voronoi(double)

Initializes a new instance of the [Voronoi](#) class.

```
public Voronoi(double minDistanceBetweenSites)
```

Parameters

`minDistanceBetweenSites` [double](#)

The minimum distance between sites.

Methods

generateVoronoi(double[], double[], double, double, double, double)

Generates the Voronoi diagram.

```
public List<GraphEdge> generateVoronoi(double[] xValuesIn, double[] yValuesIn, double minX,  
double maxX, double minY, double maxY)
```

Parameters

xValuesIn [double](#)[]

The x-coordinates of the input sites.

yValuesIn [double](#)[]

The y-coordinates of the input sites.

minX [double](#)

The minimum x-coordinate of the bounding box.

maxX [double](#)

The maximum x-coordinate of the bounding box.

minY [double](#)

The minimum y-coordinate of the bounding box.

maxY [double](#)

The maximum y-coordinate of the bounding box.

Returns

[List](#)<[GraphEdge](#)>

A list of [GraphEdge](#) representing the edges of the Voronoi diagram.

Namespace MBF.Revit.Geometry.Voronoi.Utils

Classes

[MbVoronoiAlgorithmHelpers](#)

Provides helper methods for generating Voronoi diagrams within a specified polygonal boundary.

Class MbVoronoiAlgorithmHelpers

Namespace: [MBF.Revit.Geometry.Voronoi.Utils](#)

Assembly: MBF.Revit.Geometry.dll

Provides helper methods for generating Voronoi diagrams within a specified polygonal boundary.

```
[LogAspect]  
public static class MbVoronoiAlgorithmHelpers
```

Inheritance

[object](#) ← MbVoronoiAlgorithmHelpers

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This class contains methods to create Voronoi diagrams based on a set of input points and a polygonal boundary. The generated Voronoi diagram is clipped to the boundary of the polygon, and the results are drawn in the active Revit view.

Methods

CreateVoronoiDiagramAsync(List<XYZ>, List<XYZ>)

Generates a Voronoi diagram based on the provided input points and clips it to the specified polygon boundary.

```
public static Task CreateVoronoiDiagramAsync(List<XYZ> inputPoints, List<XYZ> polygonPoints)
```

Parameters

inputPoints [List](#)<XYZ>

A list of points representing the input data for generating the Voronoi diagram. Each point must have valid X and Y coordinates.

polygonPoints [List](#)<XYZ>

A list of points defining the vertices of the polygon boundary. The polygon must be closed, with the first and last points being the same.

Returns

[Task](#)

Remarks

This method creates a Voronoi diagram by dividing the space into regions around each input point, and then clips the resulting diagram to the specified polygon boundary. The diagram is drawn as detail curves in the active view of the Revit document.

The method performs the following steps:

- Converts the polygon boundary into a geometric representation.
- Generates Voronoi edges based on the input points.
- Clips the edges to the polygon boundary and draws them in the active Revit view.
- Calculates the coverage area for each input point within the polygon boundary.

Namespace MBFWpfToolkit

Classes

[MbWindow](#)

Represents a customizable WPF window with extended properties and features, including theming, language selection, and plugin-related configurations.

Class MbWindow

Namespace: [MBFWpfToolkit](#)

Assembly: MBFWpfToolkit.dll

Represents a customizable WPF window with extended properties and features, including theming, language selection, and plugin-related configurations.

```
public class MbWindow : Window, INotifyPropertyChanged
```

Inheritance

[object](#) ← MbWindow

Implements

[INotifyPropertyChanged](#)

Derived

[HelpWizard](#), [MbMessageBox](#)

Constructors

MbWindow()

Initializes a new instance of the [MbWindow](#) class.

```
public MbWindow()
```

Remarks

This constructor sets up event handlers for the Loaded and Closed events. It ensures that main resources are cached and reused across windows.

Fields

IsThemeToggleVisibleProperty

Represents the dependency property that identifies whether the theme toggle is visible.

```
public static readonly DependencyProperty IsThemeToggleVisibleProperty
```

Field Value

[DependencyProperty](#)

PluginDescriptionProperty

Identifies the PluginDescription dependency property.

```
public static readonly DependencyProperty PluginDescriptionProperty
```

Field Value

[DependencyProperty](#)

PluginNameProperty

Identifies the PluginName dependency property.

```
public static readonly DependencyProperty PluginNameProperty
```

Field Value

[DependencyProperty](#)

PluginVersionProperty

Identifies the PluginVersion dependency property.

```
public static readonly DependencyProperty PluginVersionProperty
```

Field Value

[DependencyProperty](#)

PrimaryBrushProperty

Identifies the PrimaryBrush dependency property.

```
public static readonly DependencyProperty PrimaryBrushProperty
```

Field Value

[DependencyProperty](#)

ShowLanguagesComboBoxProperty

Identifies the ShowLanguagesComboBox dependency property.

```
public static readonly DependencyProperty ShowLanguagesComboBoxProperty
```

Field Value

[DependencyProperty](#)

ShowLogoProperty

Identifies the [ShowLogo](#) dependency property.

```
public static readonly DependencyProperty ShowLogoProperty
```

Field Value

[DependencyProperty](#)

ShowPluginNameProperty

Identifies the [ShowPluginName](#) dependency property.

```
public static readonly DependencyProperty ShowPluginNameProperty
```

Field Value

[DependencyProperty](#)

ShowPluginVersionProperty

Identifies the [ShowPluginVersion](#) dependency property.

```
public static readonly DependencyProperty ShowPluginVersionProperty
```

Field Value

[DependencyProperty](#)

Properties

IsDark

Gets or sets a value indicating whether the window should use a dark theme or not.

```
public bool IsDark { get; set; }
```

Property Value

[bool](#)

IsThemeToggleVisible

Gets or sets a value indicating whether the theme toggle control is visible.

```
public bool IsThemeToggleVisible { get; set; }
```

Property Value

[bool](#)

Remarks

By default, the theme toggle control is visible unless explicitly set to false.

this[string]

Represents the current instance of the class. Use 'this' to refer explicitly to the calling object in methods, constructors, or property accessors. It is useful to resolve naming conflicts between instance members and method or constructor arguments.

```
public string this[string key] { get; }
```

Parameters

key [string](#)

Property Value

[string](#)

MainResources

Gets or sets the shared resource dictionary that can be used to cache and reuse resources across multiple instances of [MbWindow](#).

```
public static ResourceDictionary? MainResources { get; set; }
```

Property Value

[ResourceDictionary](#)

PluginDescription

Identifies the [PluginDescription](#) dependency property.

```
public string PluginDescription { get; set; }
```

Property Value

[string](#)

PluginName

Identifies the [PluginName](#) dependency property.

```
public string PluginName { get; set; }
```

Property Value

[string](#) ↗

PluginVersion

Identifies the [PluginVersion](#) dependency property.

```
public string PluginVersion { get; set; }
```

Property Value

[string](#) ↗

PrimaryBrush

Identifies the [PrimaryBrush](#) dependency property.

```
public Color PrimaryBrush { get; set; }
```

Property Value

[Color](#) ↗

SelectedLanguage

Gets or sets the selected language for the window.

```
public CultureInfo SelectedLanguage { get; set; }
```

Property Value

[CultureInfo](#) ↗

ShowLanguagesComboBox

Identifies the [ShowLanguagesComboBox](#) dependency property.

```
public bool ShowLanguagesComboBox { get; set; }
```

Property Value

[bool](#) ↗

ShowLogo

Identifies the [ShowLogo](#) dependency property.

```
public bool ShowLogo { get; set; }
```

Property Value

[bool](#) ↗

ShowPluginName

Identifies the [ShowPluginName](#) dependency property.

```
public bool ShowPluginName { get; set; }
```

Property Value

[bool](#) ↗

ShowPluginVersion

Identifies the [ShowPluginVersion](#) dependency property.

```
public bool ShowPluginVersion { get; set; }
```

Property Value

[bool](#) ↗

SupportedLanguages

Gets the collection of supported languages available for the application.

```
public ObservableCollection<CultureInfo> SupportedLanguages { get; }
```

Property Value

[ObservableCollection](#)<[CultureInfo](#)>

Methods

ApplyThemeForElement(FrameworkElement, string)

Applies a theme to the specified framework element based on the provided theme name.

```
public static void ApplyThemeForElement(FrameworkElement element, string darkOrLight)
```

Parameters

element [FrameworkElement](#)

The framework element to which the theme will be applied.

darkOrLight [string](#)

The name of the theme, typically indicating dark or light mode.

GetAllChildrenOfType<T>(DependencyObject)

Retrieves all children of a specified type from a given dependency object in the visual tree.

```
public static IEnumerable<T> GetAllChildrenOfType<T>(DependencyObject parent) where T : DependencyObject
```

Parameters

parent [DependencyObject](#)

The parent dependency object to search within.

Returns

[IEnumerable](#)<T>

Type Parameters

T

The type of children to find.

GetPrimaryBrush()

Gets the primary brush color.

```
protected static Color GetPrimaryBrush()
```

Returns

[Color](#)

The primary brush color.

InitializeWindow()

Performs static initialization for the [MbWindow](#). Applies the primary brush color, sets window properties, configures non-client UI content, and ensures shared resources are loaded into [MainResources](#).

```
protected void InitializeWindow()
```

OnPropertyChanged(string?)

Invoked when a property value changes.

```
protected virtual void OnPropertyChanged(string? propertyName = null)
```

Parameters

propertyName [string](#)

The name of the property that changed. Automatically set by the caller if not supplied.

SetField<T>(ref T, T, string?)

Updates the specified field with a new value and raises the PropertyChanged event if the value changes.

```
protected bool SetField<T>(ref T field, T value, string? propertyName = null)
```

Parameters

field T

A reference to the field being updated.

value T

The new value to assign to the field.

propertyName [string](#)

The name of the property. This parameter is optional and is automatically supplied by the CallerMemberName attribute.

Returns

[bool](#)

True if the field value was updated; otherwise, false.

Type Parameters

T

The type of the field and value.

ShowSprite()

Displays the [MicroBimSprite](#) overlay window, which can act as a floating mascot or animation on the screen. Initializes an instance of the [MicroBimSprite](#), stores it internally, and invokes its [Show\(\)](#) method to render it.

```
public void ShowSprite()
```

Events

PropertyChanged

Occurs when a property value changes.

```
public event PropertyChangedEventHandler PropertyChanged
```

Event Type

[PropertyChangedEventHandler](#)

Namespace MBFWpfToolkit.AttachedProperties

Classes

[ComboBoxSearchBehavior](#)

Provides an attached behavior to enable search functionality in a [ComboBox](#), allowing live filtering of items based on user input.

[HelpAssistant](#)

Provides attached properties to define step-based help or onboarding instructions for UI elements. Elements can be dynamically registered and retrieved in a specific order based on their step number.

[LocalizationHelper](#)

Provides localization support for WPF controls using attached properties. When [LangKeyProperty](#) is set on a control, the corresponding localized value will be applied automatically.

[MicroBimThemeBehavior](#)

[ThemeBehavior](#)

Provides attached properties and behaviors for managing themes in a WPF application.

[ThemeUtils](#)

Provides utility methods for handling theme-related operations on WPF [FrameworkElement](#) instances.

Class ComboBoxSearchBehavior

Namespace: [MBFWpfToolkit.AttachedProperties](#)

Assembly: MBFWpfToolkit.dll

Provides an attached behavior to enable search functionality in a [ComboBox](#), allowing live filtering of items based on user input.

```
public static class ComboBoxSearchBehavior
```

Inheritance

[object](#) ← ComboBoxSearchBehavior

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

IsSearchEnabledProperty

Identifies the IsSearchEnabled dependency property. This property can be attached to a [ComboBox](#) to enable or disable live search filtering functionality.

```
public static readonly DependencyProperty IsSearchEnabledProperty
```

Field Value

[DependencyProperty](#)

true if the search functionality is enabled for the associated ComboBox; otherwise, false. The default value is false.

Remarks

When this property is set to true, the ComboBox supports a live search filtering mechanism for its items based on the current input text. It also modifies the behavior of the ComboBox, making it editable, disabling built-in text search, and keeping the dropdown open during edits. When set to false, the standard ComboBox behavior is restored.

Methods

GetFilteredItems(DependencyObject)

Gets the filtered items associated with the specified [DependencyObject](#). The filtered items are updated dynamically as the user types into the search-enabled ComboBox.

```
public static ObservableCollection<string> GetFilteredItems(DependencyObject obj)
```

Parameters

obj [DependencyObject](#)

The [DependencyObject](#) for which to retrieve the filtered items.

Returns

[ObservableCollection](#)<[string](#)>

An [ObservableCollection](#)<[T](#)> of strings representing the currently filtered items.

GetIsSearchEnabled(DependencyObject)

Gets the value of the IsSearchEnabled attached property for a specified [DependencyObject](#).

```
public static bool GetIsSearchEnabled(DependencyObject obj)
```

Parameters

obj [DependencyObject](#)

The [DependencyObject](#) from which to read the attached property value.

Returns

[bool](#)

A boolean value indicating whether the live search behavior is enabled on the specified [DependencyObject](#).

SetFilteredItems(DependencyObject, ObservableCollection<string>)

Sets the filtered collection of items to be displayed in the [ComboBox](#) based on the current search behavior.

```
public static void SetFilteredItems(DependencyObject obj, ObservableCollection<string>  
value)
```

Parameters

obj [DependencyObject](#)

The [DependencyObject](#) to set the filtered items for.

value [ObservableCollection<string>](#)

The [ObservableCollection<T>](#) of filtered items to set.

SetIsSearchEnabled(DependencyObject, bool)

Sets the value of the [IsSearchEnabledProperty](#) attached property, enabling or disabling live search filtering on a [ComboBox](#).

```
public static void SetIsSearchEnabled(DependencyObject obj, bool value)
```

Parameters

obj [DependencyObject](#)

The dependency object to which the property is attached.

value [bool](#)

A boolean value indicating whether the search feature should be enabled or disabled.

Class HelpAssistant

Namespace: [MBFWpfToolkit.AttachedProperties](#)

Assembly: MBFWpfToolkit.dll

Provides attached properties to define step-based help or onboarding instructions for UI elements. Elements can be dynamically registered and retrieved in a specific order based on their step number.

```
public class HelpAssistant
```

Inheritance

[object](#) ← HelpAssistant

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

HelpAssistant()

```
public HelpAssistant()
```

Fields

AutoRegisterProperty

Identifies the AutoRegister attached property. This property is used only to trigger element registration dynamically.

```
public static readonly DependencyProperty AutoRegisterProperty
```

Field Value

[DependencyProperty](#)

StepNumberProperty

Identifies the StepNumber attached property. Represents the sequence order of the help step.

```
public static readonly DependencyProperty StepNumberProperty
```

Field Value

[DependencyProperty](#)

StepTextProperty

Identifies the StepText attached property. Describes the instructional text for the help step.

```
public static readonly DependencyProperty StepTextProperty
```

Field Value

[DependencyProperty](#)

Methods

GetAutoRegister(DependencyObject)

Gets the AutoRegister value of the element.

```
public static bool GetAutoRegister(DependencyObject obj)
```

Parameters

obj [DependencyObject](#)

Returns

[bool](#)

GetOrderedSteps()

Retrieves all registered UI elements with valid step numbers, sorted in ascending order.

```
public static List<FrameworkElement> GetOrderedSteps()
```

Returns

[List](#) <[FrameworkElement](#)>

A sorted list of registered [FrameworkElement](#)s for the help assistant.

GetStepNumber(DependencyObject)

Gets the step number of the element.

```
public static int GetStepNumber(DependencyObject obj)
```

Parameters

obj [DependencyObject](#)

Returns

[int](#)

GetStepText(DependencyObject)

Gets the step text of the element.

```
public static string GetStepText(DependencyObject obj)
```

Parameters

obj [DependencyObject](#)

Returns

[string](#)

SetAutoRegister(DependencyObject, bool)

Sets the AutoRegister value of the element.

```
public static void SetAutoRegister(DependencyObject obj, bool value)
```

Parameters

obj [DependencyObject](#)

value [bool](#)

SetStepNumber(DependencyObject, int)

Sets the step number of the element.

```
public static void SetStepNumber(DependencyObject obj, int value)
```

Parameters

obj [DependencyObject](#)

value [int](#)

SetStepText(DependencyObject, string)

Sets the step text of the element.

```
public static void SetStepText(DependencyObject obj, string value)
```

Parameters

obj [DependencyObject](#)

value [string](#)

Class LocalizationHelper

Namespace: [MBFWpfToolkit.AttachedProperties](#)

Assembly: MBFWpfToolkit.dll

Provides localization support for WPF controls using attached properties. When [LangKeyProperty](#) is set on a control, the corresponding localized value will be applied automatically.

```
public static class LocalizationHelper
```

Inheritance

[object](#) ← LocalizationHelper

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

LangKeyProperty

Identifies the [LangKey](#) attached property. This property is used to bind a localization key to a control.

```
public static readonly DependencyProperty LangKeyProperty
```

Field Value

[DependencyProperty](#)

Methods

GetLangKey(DependencyObject)

Gets the value of the [LangKey](#) attached property.

```
public static string GetLangKey(DependencyObject obj)
```

Parameters

obj [DependencyObject](#)

Returns

[string](#)

SetLangKey(DependencyObject, string)

Sets the value of the [LangKey](#) attached property.

```
public static void SetLangKey(DependencyObject obj, string value)
```

Parameters

obj [DependencyObject](#)

value [string](#)

Class MicroBimThemeBehavior

Namespace: [MBFWpfToolkit.AttachedProperties](#)

Assembly: MBFWpfToolkit.dll

```
public static class MicroBimThemeBehavior
```

Inheritance

[object](#) ← MicroBimThemeBehavior

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

AnimateThemeOnLoadProperty

```
public static readonly DependencyProperty AnimateThemeOnLoadProperty
```

Field Value

[DependencyProperty](#)

Methods

GetAnimateThemeOnLoad(DependencyObject)

```
public static bool GetAnimateThemeOnLoad(DependencyObject element)
```

Parameters

element [DependencyObject](#)

Returns

bool ↗

SetAnimateThemeOnLoad(DependencyObject, bool)

```
public static void SetAnimateThemeOnLoad(DependencyObject element, bool value)
```

Parameters

element DependencyObject ↗

value bool ↗

Class ThemeBehavior

Namespace: [MBFWpfToolkit.AttachedProperties](#)

Assembly: MBFWpfToolkit.dll

Provides attached properties and behaviors for managing themes in a WPF application.

```
public static class ThemeBehavior
```

Inheritance

[object](#) ← ThemeBehavior

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

ApplyThemeOnLoadProperty

Represents an attached dependency property that ensures a theme is automatically applied to a [FrameworkElement](#) when it is loaded in the WPF visual tree.

```
public static readonly DependencyProperty ApplyThemeOnLoadProperty
```

Field Value

[DependencyProperty](#)

Remarks

When this property is set to true on a [FrameworkElement](#), it subscribes to the element's Loaded event. Once the element is loaded, it applies the appropriate theme ('Dark' or 'Light') based on the associated [MbWindow](#) instance's theme state. The theme is applied only if the element contains resources associated with the MicroBIM theme and if the current theme differs from the desired one.

Methods

GetApplyThemeOnLoad(DependencyObject)

Gets the value indicating whether the theme should be applied when the associated element is loaded.

```
public static bool GetApplyThemeOnLoad(DependencyObject element)
```

Parameters

element [DependencyObject](#)

The [DependencyObject](#) to retrieve the attached property value from.

Returns

[bool](#)

True if the theme should be applied on load; otherwise, false.

SetApplyThemeOnLoad(DependencyObject, bool)

```
public static void SetApplyThemeOnLoad(DependencyObject element, bool value)
```

Parameters

element [DependencyObject](#)

The dependency object (typically a framework element) on which to set the ApplyThemeOnLoad property.

value [bool](#)

A boolean value indicating whether the theme will be applied when the element loads.

Class ThemeUtils

Namespace: [MBFWpfToolkit.AttachedProperties](#)

Assembly: MBFWpfToolkit.dll

Provides utility methods for handling theme-related operations on WPF [FrameworkElement](#) instances.

```
public static class ThemeUtils
```

Inheritance

[object](#) ← ThemeUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

ApplyThemeForElement(FrameworkElement, string)

Applies a specified theme (Dark or Light) to the given FrameworkElement.

```
public static void ApplyThemeForElement(FrameworkElement element, string darkOrLight)
```

Parameters

element [FrameworkElement](#)

The FrameworkElement to which the theme will be applied.

darkOrLight [string](#)

A string specifying the theme to apply. Accepted values are "Dark" or "Light".

GetCurrentThemeForElement(FrameworkElement)

```
public static string? GetCurrentThemeForElement(FrameworkElement element)
```

Parameters

element [FrameworkElement](#)

The FrameworkElement for which the current theme is to be identified. Must be non-null and have resource dictionaries.

Returns

[string](#)

A string representing the current theme applied to the element ("Dark" or "Light"), or null if no compatible theme is found.

HasMicroBimTheme(FrameworkElement)

```
public static bool HasMicroBimTheme(FrameworkElement element)
```

Parameters

element [FrameworkElement](#)

The FrameworkElement to inspect for the MicroBIM theme.

Returns

[bool](#)

True if the FrameworkElement's resources include the MicroBIM theme; otherwise, false.

Namespace MBFWpfToolkit.Constants

Enums

[MbMessageIcon](#)

Defines icons that can be displayed in a custom message box. These icons represent different statuses or types of feedback for the user.

[SkinType](#)

Defines available theme skins for the application UI.

Enum MbMessageIcon

Namespace: [MBFWpfToolkit.Constants](#)

Assembly: MBFWpfToolkit.dll

Defines icons that can be displayed in a custom message box. These icons represent different statuses or types of feedback for the user.

```
public enum MbMessageIcon
```

Fields

Error = 16

A white X in a circle with a red background, indicating an error or failure.

Information = 64

An exclamation point in a triangle with a yellow background, providing informational feedback.

New = 512

A trash bin or cross symbol, indicating the creation of a new item.

None = 0

No icon is displayed.

Question = 48

A question mark in a circle, prompting the user for confirmation or input.

Remove = 1024

A trash bin or cross symbol, indicating the removal or deletion of an item.

Sound = 32

A bold white X in a circle with a darker red background, indicating a critical error.

Success = 256

A lowercase letter 'i' in a circle with a green background, indicating success or completion.

Warning = 128

An exclamation point in a triangle with an orange background, warning about a potential issue.

Enum SkinType

Namespace: [MBFWpfToolkit.Constants](#)

Assembly: MBFWpfToolkit.dll

Defines available theme skins for the application UI.

```
public enum SkinType
```

Fields

Dark = 1

A dark theme with a darker background and lighter foreground elements.

Default = 0

The default (light or system-defined) application theme.

Violet = 2

A violet-colored theme for a more vibrant visual experience.

Namespace MBFWpfToolkit.Controls

Classes

[MbMessageBox](#)

A custom message box window that supports MicroBIM.UI theming, icon display, and multiple button configurations.

[MicroBimSprite](#)

Represents the MicroBIM Sprite window used for displaying custom interactive UI elements.

Class MbMessageBox

Namespace: [MBFWpfToolkit.Controls](#)

Assembly: MBFWpfToolkit.dll

A custom message box window that supports MicroBIM.UI theming, icon display, and multiple button configurations.

```
public class MbMessageBox : MbWindow, INotifyPropertyChanged
```

Inheritance

[object](#) ← [MbWindow](#) ← MbMessageBox

Implements

[INotifyPropertyChanged](#)

Inherited Members

[MbWindow.IsThemeToggleVisibleProperty](#) , [MbWindow.ShowLanguagesComboBoxProperty](#) ,
[MbWindow.PluginNameProperty](#) , [MbWindow.PluginDescriptionProperty](#) ,
[MbWindow.PluginVersionProperty](#) , [MbWindow.PrimaryBrushProperty](#) , [MbWindow.ShowLogoProperty](#) ,
[MbWindow.ShowPluginNameProperty](#) , [MbWindow.ShowPluginVersionProperty](#) ,
[MbWindow.GetAllChildrenOfType<T>\(DependencyObject\)](#) ,
[MbWindow.ApplyThemeForElement\(FrameworkElement, string\)](#) , [MbWindow.InitializeWindow\(\)](#) ,
[MbWindow.ShowSprite\(\)](#) , [MbWindow.GetPrimaryBrush\(\)](#) , [MbWindow.OnPropertyChanged\(string\)](#) ,
[MbWindow.SetField<T>\(ref T, T, string\)](#) , [MbWindow.IsDark](#) , [MbWindow.SelectedLanguage](#) ,
[MbWindow.SupportedLanguages](#) , [MbWindow.this\[string\]](#) , [MbWindow.IsThemeToggleVisible](#) ,
[MbWindow.ShowLanguagesComboBox](#) , [MbWindow.PluginName](#) , [MbWindow.PluginDescription](#) ,
[MbWindow.PluginVersion](#) , [MbWindow.PrimaryBrush](#) , [MbWindow.ShowLogo](#) ,
[MbWindow.ShowPluginName](#) , [MbWindow.ShowPluginVersion](#) , [MbWindow.MainResources](#) ,
[MbWindow.PropertyChanged](#)

Methods

Show(string, MessageBoxButton, MbMessageIcon)

Displays the message box with the specified message and button configuration.

```
public static MessageBoxResult Show(string message, MessageBoxButton button =  
MessageBoxButton.OK, MbMessageIcon icon = MbMessageIcon.None)
```

Parameters

message [string](#)

The message to display.

button [MessageBoxButton](#)

The button configuration.

icon [MbMessageIcon](#)

The icon to display.

Returns

[MessageBoxResult](#)

The result of the button clicked.

Class MicroBimSprite

Namespace: [MBFWpfToolkit.Controls](#)

Assembly: MBFWpfToolkit.dll

Represents the MicroBIM Sprite window used for displaying custom interactive UI elements.

```
public class MicroBimSprite : Window, IComponentConnector
```

Inheritance

[object](#) ← MicroBimSprite

Implements

[IComponentConnector](#)

Remarks

This window is styled using MicroBIM.UI and can be used to provide compact, reusable, or themed dialogs/popups.

Constructors

MicroBimSprite()

Initializes a new instance of the [MicroBimSprite](#) window. Loads the associated XAML and prepares the window for display.

```
public MicroBimSprite()
```

Methods

InitializeComponent()

InitializeComponent

```
public void InitializeComponent()
```

Namespace MBFWpfToolkit.Controls.Help

Classes

[HelpWizard](#)

Represents an interactive in-app help wizard that guides users through UI elements step-by-step.

Class HelpWizard

Namespace: [MBFWpfToolkit.Controls.Help](#)

Assembly: MBFWpfToolkit.dll

Represents an interactive in-app help wizard that guides users through UI elements step-by-step.

```
public class HelpWizard : MbWindow, INotifyPropertyChanged, IComponentConnector
```

Inheritance

[object](#) ← [MbWindow](#) ← HelpWizard

Implements

[INotifyPropertyChanged](#), [IComponentConnector](#)

Inherited Members

[MbWindow.IsThemeToggleVisibleProperty](#), [MbWindow.ShowLanguagesComboBoxProperty](#),
[MbWindow.PluginNameProperty](#), [MbWindow.PluginDescriptionProperty](#),
[MbWindow.PluginVersionProperty](#), [MbWindow.PrimaryBrushProperty](#), [MbWindow.ShowLogoProperty](#),
[MbWindow.ShowPluginNameProperty](#), [MbWindow.ShowPluginVersionProperty](#),
[MbWindow.GetAllChildrenOfType<T>\(DependencyObject\)](#),
[MbWindow.ApplyThemeForElement\(FrameworkElement, string\)](#), [MbWindow.InitializeWindow\(\)](#),
[MbWindow.ShowSprite\(\)](#), [MbWindow.GetPrimaryBrush\(\)](#), [MbWindow.OnPropertyChanged\(string\)](#),
[MbWindow.SetField<T>\(ref T, T, string\)](#), [MbWindow.IsDark](#), [MbWindow.SelectedLanguage](#),
[MbWindow.SupportedLanguages](#), [MbWindow.this\[string\]](#), [MbWindow.IsThemeToggleVisible](#),
[MbWindow.ShowLanguagesComboBox](#), [MbWindow.PluginName](#), [MbWindow.PluginDescription](#),
[MbWindow.PluginVersion](#), [MbWindow.PrimaryBrush](#), [MbWindow.ShowLogo](#),
[MbWindow.ShowPluginName](#), [MbWindow.ShowPluginVersion](#), [MbWindow.MainResources](#),
[MbWindow.PropertyChanged](#)

Constructors

HelpWizard(MbWindow)

Initializes a new instance of the [HelpWizard](#) class.

```
public HelpWizard(MbWindow mainWindow)
```

Parameters

`mainWindow` [MbWindow](#)

The main application window hosting the UI elements to be highlighted in the help wizard.

Properties

CurrentStep

Gets or sets the index of the currently active help step.

```
public int CurrentStep { get; set; }
```

Property Value

[int](#)

Steps

Gets or sets the list of all help steps.

```
public List<HelpStep> Steps { get; set; }
```

Property Value

[List](#) <[HelpStep](#)>

Methods

InitializeComponent()

InitializeComponent

```
public void InitializeComponent()
```

Namespace MBFWpfToolkit.Converters

Classes

[BooleanToStringConverter](#)

Converts a `bool` value to a `string` based on a semicolon-delimited parameter string.

[BooleanErrorGroupToEnabledConverter](#)

A multi-value converter that checks a list of boolean values (typically `HasError` flags). If any value is `true`, it returns `false` to disable a control (e.g., a button).

[BooleanToVisibilityWithInverseConverter](#)

Converts a `bool` value to a `Visibility` value. Supports optional inversion using a converter parameter.

[EnumDisplayNameConverter](#)

A value converter for converting between enum values and their display names specified by the [DisplayAttribute](#).

[NullToBooleanConverter](#)

Converts a value to `Visibility` based on whether it is null.

[NullToVisibilityConverter](#)

Converts a value to `Visibility` based on whether it is null.

[NullToVisibilityWithInverseConverter](#)

Converts a `null` value to a `Visibility` value. Supports optional inversion using a converter parameter.

[ValidationMultiConverter](#)

A multi-value converter that validates a group of input values (typically bound from multiple `TextBox` elements). It checks for empty input and validation errors to determine whether a button (or any control) should be enabled.

Class Boolean2StringConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

Converts a [bool](#) value to a [string](#) based on a semicolon-delimited parameter string.

```
public class Boolean2StringConverter : IValueConverter
```

Inheritance

[object](#) ← Boolean2StringConverter

Implements

[IValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

Used to convert a boolean to two possible string values (e.g., "Off;On") for UI display.

Constructors

Boolean2StringConverter()

```
public Boolean2StringConverter()
```

Methods

Convert(object, Type, object, CultureInfo)

Converts a boolean value to a string.

```
public object Convert(object value, Type targetType, object parameter, CultureInfo culture)
```

Parameters

value [object](#)

The boolean value to convert.

targetType [Type](#)

The target type (should be [string](#)).

parameter [object](#)

A semicolon-separated string representing the two output values (e.g., "FalseValue;TrueValue").

culture [CultureInfo](#)

The current culture (not used).

Returns

[object](#)

Returns the second string (after semicolon) if **value** is **true**, or the first string if **false**. Returns an empty string if input is invalid.

ConvertBack(object, Type, object, CultureInfo)

Not implemented. Conversion back is not supported.

```
public object ConvertBack(object value, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

value [object](#)

targetType [Type](#)

parameter [object](#)

culture [CultureInfo](#)

Returns

[object](#)

[DoNothing](#)

Class BooleanErrorGroupToEnabledConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

A multi-value converter that checks a list of boolean values (typically HasError flags). If any value is `true`, it returns `false` to disable a control (e.g., a button).

```
public class BooleanErrorGroupToEnabledConverter : IMultiValueConverter
```

Inheritance

[object](#) ← BooleanErrorGroupToEnabledConverter

Implements

[IMultiValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

BooleanErrorGroupToEnabledConverter()

```
public BooleanErrorGroupToEnabledConverter()
```

Methods

Convert(object[], Type, object, CultureInfo)

Converts a group of boolean values to determine if a control should be enabled. If any value is `true`, the result is `false`.

```
public object Convert(object[] values, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

values [object](#)[]

An array of boolean values indicating error states.

targetType [Type](#)[]

The target type of the binding (usually [bool](#)).

parameter [object](#)[]

Optional parameter (not used).

culture [CultureInfo](#)[]

The culture info (not used).

Returns

[object](#)[]

false if any value is true; otherwise **true**.

ConvertBack(object, Type[], object, CultureInfo)

ConvertBack is not implemented. Returns [DoNothing](#).

```
public object[] ConvertBack(object value, Type[] targetTypes, object parameter,  
CultureInfo culture)
```

Parameters

value [object](#)[]

targetTypes [Type](#)[]

parameter [object](#)[]

culture [CultureInfo](#)[]

Returns

[object](#)[]

Class BooleanToVisibilityWithInverseConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

Converts a [bool](#) value to a [Visibility](#) value. Supports optional inversion using a converter parameter.

```
public class BooleanToVisibilityWithInverseConverter : IValueConverter
```

Inheritance

[object](#) ← BooleanToVisibilityWithInverseConverter

Implements

[IValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

If the parameter is set to "Inverse" (case-insensitive), the visibility result will be inverted. Useful for showing or hiding UI elements based on boolean flags with optional inversion.

Constructors

BooleanToVisibilityWithInverseConverter()

```
public BooleanToVisibilityWithInverseConverter()
```

Methods

Convert(object, Type, object, CultureInfo)

Converts a [bool](#) to [Visibility](#).

```
public object Convert(object value, Type targetType, object parameter, CultureInfo culture)
```

Parameters

value [object](#)

The boolean value to convert.

targetType [Type](#)

The target type (expected to be [Visibility](#)).

parameter [object](#)

Optional parameter. If set to "Inverse", the result will be inverted.

culture [CultureInfo](#)

Culture info (not used).

Returns

[object](#)

Returns [Visible](#) if **value** is true, or [Collapsed](#) if false. If "Inverse" is passed as a parameter, the logic is flipped.

ConvertBack(object, Type, object, CultureInfo)

Converts a [Visibility](#) value back to [bool](#).

```
public object ConvertBack(object value, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

value [object](#)

The visibility value to convert.

targetType [Type](#)

The target type (expected to be [bool](#)).

parameter [object](#)

Optional parameter (not used in ConvertBack).

culture [CultureInfo](#)

Culture info (not used).

Returns

object

Returns **true** if **value** is [Visible](#), otherwise **false**.

Class EnumDisplayNameConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

A value converter for converting between enum values and their display names specified by the [Display Attribute](#).

```
public class EnumDisplayNameConverter : IValueConverter
```

Inheritance

[object](#) ← EnumDisplayNameConverter

Implements

[IValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

EnumDisplayNameConverter()

```
public EnumDisplayNameConverter()
```

Methods

Convert(object, Type, object, CultureInfo)

Converts an [Enum](#) value to its display name specified in the [DisplayAttribute](#).

```
public object Convert(object value, Type targetType, object parameter, CultureInfo culture)
```

Parameters

value [object](#)

The enum value to be converted.

targetType [Type](#)

The target type of the binding (not used).

parameter [object](#)

An optional parameter for the converter (not used).

culture [CultureInfo](#)

The culture to be used in the converter (not used).

Returns

[object](#)

The display name of the enum value, or its string representation if no [DisplayAttribute](#) is found.

ConvertBack(object, Type, object, CultureInfo)

Converts a display name back to the corresponding [Enum](#) value.

```
public object ConvertBack(object value, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

value [object](#)

The display name to be converted back to the enum value.

targetType [Type](#)

The target enum type.

parameter [object](#)

An optional parameter for the converter (not used).

culture [CultureInfo](#)

The culture to be used in the converter (not used).

Returns

[object](#)

The corresponding enum value that matches the display name or field name.

Exceptions

[ArgumentException](#)

Thrown if no matching enum value is found for the display name.

Class NullToBooleanConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

Converts a value to [Visibility](#) based on whether it is null.

```
public class NullToBooleanConverter : IValueConverter
```

Inheritance

[object](#) ← NullToBooleanConverter

Implements

[IValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

If the parameter is "Inverse" (case-insensitive), visibility is inverted.

Constructors

NullToBooleanConverter()

```
public NullToBooleanConverter()
```

Methods

Convert(object?, Type, object, CultureInfo)

```
public object Convert(object? value, Type targetType, object parameter, CultureInfo culture)
```

Parameters

`value` [object](#)

`targetType` [Type](#)

`parameter` [object](#)

`culture` [CultureInfo](#)

Returns

[object](#)

ConvertBack(object, Type, object, CultureInfo)

```
public object ConvertBack(object value, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

`value` [object](#)

`targetType` [Type](#)

`parameter` [object](#)

`culture` [CultureInfo](#)

Returns

[object](#)

Class NullToVisibilityConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

Converts a value to [Visibility](#) based on whether it is null.

```
public class NullToVisibilityConverter : IValueConverter
```

Inheritance

[object](#) ← NullToVisibilityConverter

Implements

[IValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

If the parameter is "Inverse" (case-insensitive), visibility is inverted.

Constructors

NullToVisibilityConverter()

```
public NullToVisibilityConverter()
```

Methods

Convert(object, Type, object, CultureInfo)

```
public object Convert(object value, Type targetType, object parameter, CultureInfo culture)
```

Parameters

`value` [object](#)

`targetType` [Type](#)

`parameter` [object](#)

`culture` [CultureInfo](#)

Returns

[object](#)

ConvertBack(object, Type, object, CultureInfo)

```
public object ConvertBack(object value, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

`value` [object](#)

`targetType` [Type](#)

`parameter` [object](#)

`culture` [CultureInfo](#)

Returns

[object](#)

Class NullToVisibilityWithInverseConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

Converts a `null` value to a [Visibility](#) value. Supports optional inversion using a converter parameter.

```
public class NullToVisibilityWithInverseConverter : IValueConverter
```

Inheritance

[object](#) ← NullToVisibilityWithInverseConverter

Implements

[IValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

If the parameter is set to "Inverse" (case-insensitive), the visibility result will be inverted. Useful for showing/hiding UI elements based on null presence.

Constructors

NullToVisibilityWithInverseConverter()

```
public NullToVisibilityWithInverseConverter()
```

Methods

Convert(object, Type, object, CultureInfo)

Converts a `null` value to [Collapsed](#) or [Visible](#).

```
public object Convert(object value, Type targetType, object parameter, CultureInfo culture)
```

Parameters

value [object](#)

The value to check for null.

targetType [Type](#)

The target type (expected to be [Visibility](#)).

parameter [object](#)

Optional parameter. If set to "Inverse", the result is inverted.

culture [CultureInfo](#)

Culture info (not used).

Returns

[object](#)

[Visible](#) if the value is not null; otherwise [Collapsed](#). If "Inverse" is passed, the result is flipped.

ConvertBack(object, Type, object, CultureInfo)

Not supported: converts back from [Visibility](#) to object.

```
public object ConvertBack(object value, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

value [object](#)

targetType [Type](#)

parameter [object](#)

culture [CultureInfo](#)

Returns

[object](#)

Class ValidationMultiConverter

Namespace: [MBFWpfToolkit.Converters](#)

Assembly: MBFWpfToolkit.dll

A multi-value converter that validates a group of input values (typically bound from multiple [TextBox](#) elements). It checks for empty input and validation errors to determine whether a button (or any control) should be enabled.

```
public class ValidationMultiConverter : IMultiValueConverter
```

Inheritance

[object](#) ← ValidationMultiConverter

Implements

[IMultiValueConverter](#)

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Remarks

This converter expects alternating values: [Text, HasError, Text, HasError, ...]. If any Text is null/empty or any HasError is true, the result is false.

Constructors

ValidationMultiConverter()

```
public ValidationMultiConverter()
```

Methods

Convert(object[], Type, object, CultureInfo)

Validates a group of values to determine if a control (e.g., a button) should be enabled.

```
public object Convert(object[] values, Type targetType, object parameter,  
CultureInfo culture)
```

Parameters

values [object](#)[]

An array of values from multiple bindings. Alternating pattern: Text, HasError, Text, HasError...

targetType [Type](#)

The target type of the binding (usually [bool](#)).

parameter [object](#)

Optional parameter (not used).

culture [CultureInfo](#)

The culture info (not used).

Returns

[object](#)

Returns [true](#) if all inputs are non-empty and have no validation errors; otherwise [false](#).

ConvertBack(object, Type[], object, CultureInfo)

ConvertBack is not implemented. Returns [DoNothing](#).

```
public object[] ConvertBack(object value, Type[] targetTypes, object parameter,  
CultureInfo culture)
```

Parameters

value [object](#)

targetTypes [Type](#)[]

parameter [object](#)

culture [CultureInfo](#)

Returns

[object](#)[]

An array of [DoNothing](#).

Namespace MBFWpfToolkit.Extensions

Classes

[CollectionExtensions](#)

Provides extension methods for working with collections.

[ListExtensions](#)

Provides extension methods for [List<T>](#) to support additional operations.

[ToleranceGroup< TKey, TElement >](#)

Represents a collection of elements that share a common key, with additional functionality for grouping and list operations.

Class CollectionExtensions

Namespace: [MBFWpfToolkit.Extensions](#)

Assembly: MBFWpfToolkit.dll

Provides extension methods for working with collections.

```
public static class CollectionExtensions
```

Inheritance

[object](#) ← CollectionExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

GroupByWithTolerance<T>(IEnumerable<T>, Func<T, double>, double)

Groups elements of a sequence based on a numeric key and a specified tolerance.

```
public static IEnumerable<IGrouping<double, T>> GroupByWithTolerance<T>(this IEnumerable<T>  
source, Func<T, double> keySelector, double tolerance)
```

Parameters

source [IEnumerable](#)<T>

The sequence of elements to group. Cannot be null.

keySelector [Func](#)<T, [double](#)>

A function to extract the numeric key from each element. Cannot be null.

tolerance [double](#)

The maximum allowable difference between keys for elements to be grouped together. Must be a non-negative value.

Returns

[IEnumerable](#) <[IGrouping](#) <[double](#), T>>

A sequence of groupings, where each grouping contains elements whose keys differ by no more than the specified tolerance.

Type Parameters

T

The type of the elements in the source sequence.

Remarks

This method first sorts the elements by their numeric keys and then groups them based on the specified tolerance. The keys are rounded to three decimal places for comparison.

ToObservableCollection<T>(IEnumerable<T>)

Converts an enumerable collection to an ObservableCollection.

```
public static ObservableCollection<T> ToObservableCollection<T>(this IEnumerable<T> source)
```

Parameters

source [IEnumerable](#)<T>

The source enumerable collection to convert.

Returns

[ObservableCollection](#) <T>

An ObservableCollection containing the elements from the source.

Type Parameters

T

The type of elements in the collection.

Class ListExtensions

Namespace: [MBFWpfToolkit.Extensions](#)

Assembly: MBFWpfToolkit.dll

Provides extension methods for [List<T>](#) to support additional operations.

```
public static class ListExtensions
```

Inheritance

[object](#) ← ListExtensions

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

Move<T>(List<T>, int, int)

Moves an item within a [List<T>](#) from one index to another.

```
public static void Move<T>(this List<T> list, int oldIndex, int newIndex)
```

Parameters

list [List](#)<T>

The list in which the item will be moved.

oldIndex [int](#)

The current index of the item.

newIndex [int](#)

The target index to move the item to.

Type Parameters

T

The type of elements in the list.

Remarks

If `oldIndex` and `newIndex` are equal, or if either index is out of range, the method does nothing.

Class ToleranceGroup<TKey, TElement>

Namespace: [MBFWpfToolkit.Extensions](#)

Assembly: MBFWpfToolkit.dll

Represents a collection of elements that share a common key, with additional functionality for grouping and list operations.

```
public class ToleranceGroup<TKey, TElement> : List<TElement>, IList<TElement>,  
ICollection<TElement>, IList, ICollection, IReadOnlyList<TElement>,  
IReadOnlyCollection<TElement>, IGrouping<TKey, TElement>, IEnumerable<TElement>, IEnumerable
```

Type Parameters

TKey

The type of the key associated with the group.

TElement

The type of the elements in the group.

Inheritance

[object](#) ← [List](#)<TElement> ← ToleranceGroup<TKey, TElement>

Implements

[IList](#)<TElement>, [ICollection](#)<TElement>, [IList](#), [ICollection](#), [IReadOnlyList](#)<TElement>,
 [IReadOnlyCollection](#)<TElement>, [IGrouping](#)<TKey, TElement>, [IEnumerable](#)<TElement>,
 [IEnumerable](#)

Inherited Members

[List<TElement>.Add\(TElement\)](#), [List<TElement>.AddRange\(IEnumerable<TElement>\)](#),
[List<TElement>.AsReadOnly\(\)](#),
[List<TElement>.BinarySearch\(int, int, TElement, IComparer<TElement>\)](#),
[List<TElement>.BinarySearch\(TElement\)](#),
[List<TElement>.BinarySearch\(TElement, IComparer<TElement>\)](#), [List<TElement>.Clear\(\)](#),
[List<TElement>.Contains\(TElement\)](#),
[List<TElement>.ConvertAll<TOutput>\(Converter<TElement, TOutput>\)](#),
[List<TElement>.CopyTo\(TElement\[\]\)](#), [List<TElement>.CopyTo\(int, TElement\[\], int, int\)](#),
[List<TElement>.CopyTo\(TElement\[\], int\)](#), [List<TElement>.Exists\(Predicate<TElement>\)](#),
[List<TElement>.Find\(Predicate<TElement>\)](#), [List<TElement>.FindAll\(Predicate<TElement>\)](#),

[List<TElement>.FindIndex\(Predicate<TElement>\)](#) ,
[List<TElement>.FindIndex\(int, Predicate<TElement>\)](#) ,
[List<TElement>.FindIndex\(int, int, Predicate<TElement>\)](#) ,
[List<TElement>.FindLast\(Predicate<TElement>\)](#) ,
[List<TElement>.FindLastIndex\(Predicate<TElement>\)](#) ,
[List<TElement>.FindLastIndex\(int, Predicate<TElement>\)](#) ,
[List<TElement>.FindLastIndex\(int, int, Predicate<TElement>\)](#) ,
[List<TElement>.ForEach\(Action<TElement>\)](#) , [List<TElement>.GetEnumerator\(\)](#) ,
[List<TElement>.GetRange\(int, int\)](#) , [List<TElement>.IndexOf\(TElement\)](#) ,
[List<TElement>.IndexOf\(TElement, int\)](#) , [List<TElement>.IndexOf\(TElement, int, int\)](#) ,
[List<TElement>.Insert\(int, TElement\)](#) , [List<TElement>.InsertRange\(int, IEnumerable<TElement>\)](#) ,
[List<TElement>.LastIndexOf\(TElement\)](#) , [List<TElement>.LastIndexOf\(TElement, int\)](#) ,
[List<TElement>.LastIndexOf\(TElement, int, int\)](#) , [List<TElement>.Remove\(TElement\)](#) ,
[List<TElement>.RemoveAll\(Predicate<TElement>\)](#) , [List<TElement>.RemoveAt\(int\)](#) ,
[List<TElement>.RemoveRange\(int, int\)](#) , [List<TElement>.Reverse\(\)](#) ,
[List<TElement>.Reverse\(int, int\)](#) , [List<TElement>.Sort\(\)](#) ,
[List<TElement>.Sort\(IComparer<TElement>\)](#) , [List<TElement>.Sort\(int, int, IComparer<TElement>\)](#) ,
[List<TElement>.Sort\(Comparison<TElement>\)](#) , [List<TElement>.ToArray\(\)](#) ,
[List<TElement>.TrimExcess\(\)](#) , [List<TElement>.TrueForAll\(Predicate<TElement>\)](#) ,
[List<TElement>.Capacity](#) , [List<TElement>.Count](#) , [List<TElement>.this\[int\]](#) , [object.ToString\(\)](#) ,
[object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) , [object.ReferenceEquals\(object, object\)](#) ,
[object.GetHashCode\(\)](#) , [object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Extension Methods

[CollectionExtensions.GroupByWithTolerance<T>\(IEnumerable<T>, Func<T, double>, double\)](#) ,
[CollectionExtensions.ToObservableCollection<T>\(IEnumerable<T>\)](#) ,
[ListExtensions.Move<T>\(List<T>, int, int\)](#).

Remarks

This class combines the functionality of [IGrouping< TKey, TElement >](#) and [List< T >](#), allowing grouped elements to be accessed and manipulated as a list.

Constructors

ToleranceGroup(TKey)

Represents a group of items that share a common key and are grouped based on a specified tolerance.

```
public ToleranceGroup(TKey key)
```

Parameters

key TKey

The key that identifies the group. Cannot be null.

Remarks

This class is typically used in scenarios where items need to be grouped by a key with a tolerance-based condition.

Properties

Key

Gets the key associated with the current object.

```
public TKey Key { get; }
```

Property Value

TKey

Namespace MBFWpfToolkit.Helpers

Classes

[MbNotification](#)

Provides utility methods to display styled notifications using MicroBIM.UI's MicroBIM.UI.Controls.Growl system.

[MbResourceHelper](#)

Provides helper methods for retrieving theme and skin resources in a WPF application.

[PasswordHelper](#)

Provides attached properties and helper methods to enable binding for the Password property of PasswordBox controls.

[WindowController](#)

Manages the lifecycle of modeless WPF windows to prevent duplicates, maintain a global reference list, and enable programmatic control.

Class MbNotification

Namespace: [MBFWpfToolkit.Helpers](#)

Assembly: MBFWpfToolkit.dll

Provides utility methods to display styled notifications using MicroBIM.UI's MicroBIM.UI.Controls.Growl system.

```
public static class MbNotification
```

Inheritance

[object](#) ← MbNotification

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Properties

Host

```
public static MbWindow Host { get; set; }
```

Property Value

[MbWindow](#)

Methods

ShowError(string, int)

Displays an error notification with a red cross icon.

```
public static void ShowError(string message, int waitTime = 2)
```

Parameters

message [string](#)

The message to be shown in the notification.

waitTime [int](#)

The duration (in seconds) the notification remains visible. Default is 2 seconds.

ShowInfo(string, int)

Displays an informational notification with a blue info icon.

```
public static void ShowInfo(string message, int waitTime = 2)
```

Parameters

message [string](#)

The message to be shown in the notification.

waitTime [int](#)

The duration (in seconds) the notification remains visible. Default is 2 seconds.

ShowSuccess(string, int)

Displays a success notification with a green check icon.

```
public static void ShowSuccess(string message, int waitTime = 2)
```

Parameters

message [string](#)

The message to be shown in the notification.

waitTime [int](#)

The duration (in seconds) the notification remains visible. Default is 2 seconds.

ShowWarning(string, int)

Displays a warning notification with a specified message and optional wait time.

```
public static void ShowWarning(string message, int waitTime = 2)
```

Parameters

message [string](#)

The warning message to display.

waitTime [int](#)

The time in seconds to display the notification before it disappears. Defaults to 2 seconds if not specified.

Class MbResourceHelper

Namespace: [MBFWpfToolkit.Helpers](#)

Assembly: MBFWpfToolkit.dll

Provides helper methods for retrieving theme and skin resources in a WPF application.

```
public class MbResourceHelper
```

Inheritance

[object](#) ← MbResourceHelper

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

MbResourceHelper()

```
public MbResourceHelper()
```

Methods

GetResource<T>(string)

Retrieves a resource from the application's merged resource dictionaries by key.

```
public static T GetResource<T>(string key)
```

Parameters

key [string](#)

The key of the resource to retrieve.

Returns

T

The resource cast to type T if found; otherwise, the default value of T.

Type Parameters

T

The expected type of the resource.

GetSkin(SkinType)

Loads a built-in MicroBIM.UI skin resource dictionary by skin type.

```
public static ResourceDictionary GetSkin(SkinType skin)
```

Parameters

skin [SkinType](#)

The [SkinType](#) indicating which skin to load.

Returns

[ResourceDictionary](#)

The loaded [ResourceDictionary](#).

GetSkin(Assembly, string, SkinType)

Loads a skin resource dictionary from a specified assembly and path.

```
public static ResourceDictionary GetSkin(Assembly assembly, string themePath, SkinType skin)
```

Parameters

assembly [Assembly](#)

The assembly containing the skin resources.

themePath [string](#)

The path to the skin directory inside the assembly.

skin [SkinType](#)

The [SkinType](#) indicating which skin to load.

Returns

[ResourceDictionary](#)

The loaded [ResourceDictionary](#) for the specified skin.

GetStandaloneTheme()

Loads the standalone MicroBIM.UI theme resource dictionary.

```
public static ResourceDictionary GetStandaloneTheme()
```

Returns

[ResourceDictionary](#)

The loaded [ResourceDictionary](#).

GetTheme()

Retrieves the current theme resource dictionary. If not already loaded, it loads the standalone MicroBIM.UI theme.

```
public static ResourceDictionary GetTheme()
```

Returns

[ResourceDictionary](#)

The [ResourceDictionary](#) representing the current theme.

Class PasswordHelper

Namespace: [MBFWpfToolkit.Helpers](#)

Assembly: MBFWpfToolkit.dll

Provides attached properties and helper methods to enable binding for the Password property of PasswordBox controls.

```
public static class PasswordHelper
```

Inheritance

[object](#) ← PasswordHelper

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

AttachProperty

Attached property to enable or disable binding functionality for PasswordBox.

```
public static readonly DependencyProperty AttachProperty
```

Field Value

[DependencyProperty](#)

PasswordProperty

Attached property to bind the password value.

```
public static readonly DependencyProperty PasswordProperty
```

Field Value

Methods

GetAttach(DependencyObject)

Gets the value of the Attach property.

```
public static bool GetAttach(DependencyObject dp)
```

Parameters

dp [DependencyObject](#)

Returns

[bool](#)

GetPassword(DependencyObject)

Gets the bound password string from the attached property.

```
public static string GetPassword(DependencyObject dp)
```

Parameters

dp [DependencyObject](#)

Returns

[string](#)

SetAttach(DependencyObject, bool)

Sets the Attach property to enable password binding on the given object.

```
public static void SetAttach(DependencyObject dp, bool value)
```

Parameters

dp [DependencyObject](#)

value [bool](#)

SetPassword(DependencyObject, string)

Sets the bound password string on the attached property.

```
public static void SetPassword(DependencyObject dp, string value)
```

Parameters

dp [DependencyObject](#)

value [string](#)

Class WindowController

Namespace: [MBFWpfToolkit.Helpers](#)

Assembly: MBFWpfToolkit.dll

Manages the lifecycle of modeless WPF windows to prevent duplicates, maintain a global reference list, and enable programmatic control.

```
public static class WindowController
```

Inheritance

[object](#) ← WindowController

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

Close<T>()

Closes all windows of type **T** and removes them from the tracking list.

```
public static void Close<T>() where T : Window
```

Type Parameters

T

The type of the window to close.

Focus<T>()

Attempts to focus an existing window of type **T**. If minimized or hidden, restores and shows it.

```
public static bool Focus<T>() where T : Window
```

Returns

bool ↗

True if an existing window was found and focused; otherwise false.

Type Parameters

T

The type of the window to focus.

Hide<T>()

Hides all windows of type T.

```
public static void Hide<T>() where T : Window
```

Type Parameters

T

The type of the window to hide.

Show(Window)

Shows a modeless window and registers it in the controller.

```
public static void Show(Window window)
```

Parameters

window Window

The window to show.

Show(Window, IntPtr)

Shows a modeless window with a native owner handle.

```
public static void Show(Window window, IntPtr handle)
```

Parameters

window Window

The window to show.

handle [IntPtr](#)

The native owner window handle (HWND).

ShowDialog(Window)

Shows a modal dialog window and registers it in the controller.

```
public static bool? ShowDialog(Window window)
```

Parameters

window Window

The dialog window to show.

Returns

[bool](#)?

True if the user accepted the dialog (DialogResult == true); otherwise, false.

ShowDialog(Window, IntPtr)

Displays the specified MicroBIM.UI.Controls.Window as a modal dialog and returns the result.

```
public static bool? ShowDialog(Window window, IntPtr handle)
```

Parameters

window Window

The MicroBIM.UI.Controls.Window to display as a modal dialog. Cannot be null.

handle [IntPtr](#)

A handle to the owner window. This establishes the ownership relationship between the dialog and the parent window.

Returns

[bool](#)?

A nullable [bool](#) indicating the dialog result: [true](#) if the user accepted the dialog, [false](#) if the user canceled it, or [null](#) if no result was specified.

Remarks

This method sets the owner of the specified MicroBIM.UI.Controls.Window using the provided handle before displaying it. Ensure that the [handle](#) corresponds to a valid window handle to avoid unexpected behavior.

Show<T>()

Shows an already existing window of type [T](#) if found.

```
public static void Show<T>() where T : Window
```

Type Parameters

[T](#)

The type of the window to show.

Namespace MBFWpfToolkit.MbViewModel

Classes

[MbBaseViewModel](#)

Represents the base ViewModel class inheriting from ObservableValidator. Provides a common set of functionalities for ViewModels, including validation capabilities.

Class MbBaseViewModel

Namespace: [MBFWpfToolkit.MbViewModel](#)

Assembly: MBFWpfToolkit.dll

Represents the base ViewModel class inheriting from ObservableValidator. Provides a common set of functionalities for ViewModels, including validation capabilities.

```
public class MbBaseViewModel : ObservableValidator
```

Inheritance

[object](#) ← MbBaseViewModel

Constructors

MbBaseViewModel()

```
public MbBaseViewModel()
```

Properties

MbWindow

Represents a property of type [MbWindow](#) used within the ViewModel.

```
public MbWindow? MbWindow { get; set; }
```

Property Value

[MbWindow](#)

A reference to an instance of [MbWindow](#). This property can be used to set or retrieve details of the associated [MbWindow](#), enabling interaction with its properties, such as theme toggling, supported languages, plugin information, and more.

Remarks

This property is primarily used to reference an instance of the [MbWindow](#) class, which provides properties and functionality for managing window-level settings such as themes, language settings, and display options for plugins.

Namespace MBFWpfToolkit.Models

Classes

[HelpStep](#)

Represents a help step in the UI help wizard with an associated UI element, descriptive text, and order.

Class HelpStep

Namespace: [MBFWpfToolkit.Models](#)

Assembly: MBFWpfToolkit.dll

Represents a help step in the UI help wizard with an associated UI element, descriptive text, and order.

```
public class HelpStep
```

Inheritance

[object](#) ← HelpStep

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Constructors

HelpStep()

```
public HelpStep()
```

Properties

Element

Gets or sets the UI element associated with this help step.

```
public UIElement Element { get; set; }
```

Property Value

[UIElement](#)

Remarks

This UI element is used to anchor tooltips or visual guidance during the help walkthrough.

StepNumber

Gets or sets the order number of the step in the help sequence.

```
public int StepNumber { get; set; }
```

Property Value

[int](#)

StepText

Gets or sets the textual description of the step to be shown to the user.

```
public string StepText { get; set; }
```

Property Value

[string](#)

Namespace MBFWpfToolkit.Properties.Langs

Classes

[Lang_en](#)

A strongly-typed resource class, for looking up localized strings, etc.

Class Lang_en

Namespace: [MBFWpfToolkit.Properties.Langs](#)

Assembly: MBFWpfToolkit.dll

A strongly-typed resource class, for looking up localized strings, etc.

```
public class Lang_en
```

Inheritance

[object](#) ← Lang_en

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Properties

About

Looks up a localized string similar to About.

```
public static string About { get; }
```

Property Value

[string](#)

And

Looks up a localized string similar to and.

```
public static string And { get; }
```

Property Value

[string](#)

BIMAssets

Looks up a localized string similar to BIMAssets.

```
public static string BIMAssets { get; }
```

Property Value

[string](#)

BookMode

Looks up a localized string similar to Book Mode.

```
public static string BookMode { get; }
```

Property Value

[string](#)

Cancel

Looks up a localized string similar to Cancel.

```
public static string Cancel { get; }
```

Property Value

[string](#)

ClosePDF

Looks up a localized string similar to Close PDF.

```
public static string ClosePDF { get; }
```

Property Value

[string](#)

Confirm

Looks up a localized string similar to Confirm.

```
public static string Confirm { get; }
```

Property Value

[string](#) ↗

ContinuousPagesMode

Looks up a localized string similar to Continuous Pages Mode.

```
public static string ContinuousPagesMode { get; }
```

Property Value

[string](#) ↗

Culture

Overrides the current thread's CurrentUICulture property for all resource lookups using this strongly typed resource class.

```
public static CultureInfo Culture { get; set; }
```

Property Value

[CultureInfo](#) ↗

DPI_

Looks up a localized string similar to DPI:.

```
public static string DPI_ { get; }
```

PropertyValue

[string ↗](#)

DecimalValue

Looks up a localized string similar to Value must be a valid decimal..

```
public static string DecimalValue { get; }
```

PropertyValue

[string ↗](#)

Delete

Looks up a localized string similar to Delete.

```
public static string Delete { get; }
```

PropertyValue

[string ↗](#)

DoubleValue

Looks up a localized string similar to Value must be a valid double..

```
public static string DoubleValue { get; }
```

PropertyValue

[string ↗](#)

Download

Looks up a localized string similar to Download.

```
public static string Download { get; }
```

Property Value

[string](#) ↗

DownloadSelected

Looks up a localized string similar to DownloadSelected.

```
public static string DownloadSelected { get; }
```

Property Value

[string](#) ↗

Edit

Looks up a localized string similar to Edit.

```
public static string Edit { get; }
```

Property Value

[string](#) ↗

FileType

Looks up a localized string similar to File Type.

```
public static string FileType { get; }
```

Property Value

[string](#) ↗

FileURL

Looks up a localized string similar to File URL.

```
public static string FileURL { get; }
```

Property Value

[string](#)

Findindocument

Looks up a localized string similar to Find in document....

```
public static string Findindocument { get; }
```

Property Value

[string](#)

FitHeight

Looks up a localized string similar to Fit Height.

```
public static string FitHeight { get; }
```

Property Value

[string](#)

FitWidth

Looks up a localized string similar to Fit Width.

```
public static string FitWidth { get; }
```

Property Value

[string](#)

From

Looks up a localized string similar to From.

```
public static string From { get; }
```

Property Value

[string](#) ↗

GetPageText

Looks up a localized string similar to Get Page Text.

```
public static string GetPageText { get; }
```

Property Value

[string](#) ↗

HandTool

Looks up a localized string similar to Hand Tool.

```
public static string HandTool { get; }
```

Property Value

[string](#) ↗

Installers

Looks up a localized string similar to Installers.

```
public static string Installers { get; }
```

Property Value

[string](#) ↗

IntValue

Looks up a localized string similar to Value must be a valid integer..

```
public static string IntValue { get; }
```

Property Value

[string](#) ↗

InvalidFormat

Looks up a localized string similar to InvalidFormat!.

```
public static string InvalidFormat { get; }
```

Property Value

[string](#) ↗

Islefttorightdocument

Looks up a localized string similar to Is left to right document.

```
public static string Islefttorightdocument { get; }
```

Property Value

[string](#) ↗

Isrighttoleftdocument

Looks up a localized string similar to Is right to left document.

```
public static string Isrighttoleftdocument { get; }
```

Property Value

[string ↗](#)

Light_DarkMode

Looks up a localized string similar to Light/Dark Mode.

```
public static string Light_DarkMode { get; }
```

Property Value

[string ↗](#)

Miscellaneous

Looks up a localized string similar to Miscellaneous.

```
public static string Miscellaneous { get; }
```

Property Value

[string ↗](#)

NextPage

Looks up a localized string similar to Next Page.

```
public static string NextPage { get; }
```

Property Value

[string ↗](#)

No

Looks up a localized string similar to No.

```
public static string No { get; }
```

Property Value

[string](#)

NumberRange

Looks up a localized string similar to Value must be between.

```
public static string NumberRange { get; }
```

Property Value

[string](#)

OpenPdf

Looks up a localized string similar to Open Pdf.

```
public static string OpenPdf { get; }
```

Property Value

[string](#)

PdfInformation

Looks up a localized string similar to Pdf Information.

```
public static string PdfInformation { get; }
```

Property Value

[string](#)

PreviousPage

Looks up a localized string similar to Previous Page.

```
public static string PreviousPage { get; }
```

Property Value

[string](#) ↗

Renderallpages

Looks up a localized string similar to Render all pages.

```
public static string Renderallpages { get; }
```

Property Value

[string](#) ↗

Required

Looks up a localized string similar to Value cannot be empty..

```
public static string Required { get; }
```

Property Value

[string](#) ↗

ResourceManager

Returns the cached ResourceManager instance used by this class.

```
public static ResourceManager ResourceManager { get; }
```

Property Value

[ResourceManager](#) ↗

RotateLeft

Looks up a localized string similar to Rotate Left.

```
public static string RotateLeft { get; }
```

Property Value

[string](#) ↗

RotateRight

Looks up a localized string similar to Rotate Right.

```
public static string RotateRight { get; }
```

Property Value

[string](#) ↗

Save

Looks up a localized string similar to Save.

```
public static string Save { get; }
```

Property Value

[string](#) ↗

SaveasImages

Looks up a localized string similar to Save as Images.

```
public static string SaveasImages { get; }
```

Property Value

[string](#)

Searchforinstallers

Looks up a localized string similar to Search for installers....

```
public static string Searchforinstallers { get; }
```

Property Value

[string](#)

Searchterm

Looks up a localized string similar to Search term.

```
public static string Searchterm { get; }
```

Property Value

[string](#)

SelectLanguage

Looks up a localized string similar to Select Language.

```
public static string SelectLanguage { get; }
```

Property Value

[string](#)

ShowBookmarks

Looks up a localized string similar to Show Bookmarks.

```
public static string ShowBookmarks { get; }
```

Property Value

[string](#)

SinglePageMode

Looks up a localized string similar to Single Page Mode.

```
public static string SinglePageMode { get; }
```

Property Value

[string](#)

SwapToDarkMode

Looks up a localized string similar to Swap to dark mode.

```
public static string SwapToDarkMode { get; }
```

Property Value

[string](#)

SwapToLightMode

Looks up a localized string similar to Swap to light mode.

```
public static string SwapToLightMode { get; }
```

Property Value

[string](#)

To

Looks up a localized string similar to To.

```
public static string To { get; }
```

Property Value

[string](#)

TransparentPage

Looks up a localized string similar to Transparent Page.

```
public static string TransparentPage { get; }
```

Property Value

[string](#)

Upload

Looks up a localized string similar to Upload.

```
public static string Upload { get; }
```

Property Value

[string](#)

UploadedDate

Looks up a localized string similar to Uploaded Date.

```
public static string UploadedDate { get; }
```

Property Value

[string](#) ↗

Url

Looks up a localized string similar to URL.

```
public static string Url { get; }
```

Property Value

[string](#) ↗

Version

Looks up a localized string similar to Version.

```
public static string Version { get; }
```

Property Value

[string](#) ↗

Yes

Looks up a localized string similar to Yes.

```
public static string Yes { get; }
```

Property Value

[string](#) ↗

Zoomin

Looks up a localized string similar to Zoom in.

```
public static string Zoomin { get; }
```

Property Value

[string ↗](#)

Zoomout

Looks up a localized string similar to Zoom out.

```
public static string Zoomout { get; }
```

Property Value

[string ↗](#)

contact_us

Looks up a localized string similar to Contact us.

```
public static string contact_us { get; }
```

Property Value

[string ↗](#)

of

Looks up a localized string similar to of.

```
public static string of { get; }
```

Property Value

[string ↗](#)

Namespace MBFWpfToolkit.Utils

Classes

[WindowUtils](#)

Provides utility functions for managing windows and processes in a WPF application.

Class WindowUtils

Namespace: [MBFWpfToolkit.Utils](#)

Assembly: MBFWpfToolkit.dll

Provides utility functions for managing windows and processes in a WPF application.

```
public static class WindowUtils
```

Inheritance

[object](#) ← WindowUtils

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Methods

OpenLink(object)

Opens a link in the default web browser or associated application.

```
public static void OpenLink(object url)
```

Parameters

`url` [object](#)

The URL or file path to open. This should be a valid string representation of the resource.

Exceptions

[ArgumentNullException](#)

Thrown when the `url` is null.

[InvalidOperationException](#)

Thrown when the `url` is not a valid string.

Namespace MBFWpfToolkit.ValidationRules

Classes

[DecimalValidationRule](#)

Validation rule for decimal input with localization support.

[DoubleValidationRule](#)

Validation rule for double input with localization support.

[IntegerValidationRule](#)

Validation rule for integer input with localization support.

[StringValidationRule](#)

Validation rule for string input with localization support.

Class DecimalValidationRule

Namespace: [MBFWpfToolkit.ValidationRules](#)

Assembly: MBFWpfToolkit.dll

Validation rule for decimal input with localization support.

```
public class DecimalValidationRule : ValidationRule
```

Inheritance

[object](#) ← [ValidationRule](#) ← DecimalValidationRule

Inherited Members

[ValidationRule.Validate\(object, CultureInfo, BindingExpressionBase\)](#) ,
[ValidationRule.Validate\(object, CultureInfo, BindingGroup\)](#) , [ValidationRule.ValidationStep](#) ,
[ValidationRule.ValidatesOnTargetUpdated](#) , [object.ToString\(\)](#) , [object.Equals\(object\)](#) ,
[object.Equals\(object, object\)](#) , [object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) ,
[object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Constructors

DecimalValidationRule()

```
public DecimalValidationRule()
```

Properties

IsRequired

Gets or sets a value indicating whether the input is required.

```
public bool IsRequired { get; set; }
```

Property Value

[bool](#)

Maximum

Gets or sets the maximum allowable value.

```
public decimal Maximum { get; set; }
```

Property Value

[decimal](#) ↗

Minimum

Gets or sets the minimum allowable value.

```
public decimal Minimum { get; set; }
```

Property Value

[decimal](#) ↗

Methods

Validate(object, CultureInfo)

Validates the input value.

```
public override ValidationResult Validate(object value, CultureInfo cultureInfo)
```

Parameters

value [object](#) ↗

The value to validate.

cultureInfo [CultureInfo](#) ↗

The culture information.

Returns

ValidationResult

A [ValidationResult](#) indicating whether the value is valid.

Class DoubleValidationRule

Namespace: [MBFWpfToolkit.ValidationRules](#)

Assembly: MBFWpfToolkit.dll

Validation rule for double input with localization support.

```
public class DoubleValidationRule : ValidationRule
```

Inheritance

[object](#) ← [ValidationRule](#) ← DoubleValidationRule

Inherited Members

[ValidationRule.Validate\(object, CultureInfo, BindingExpressionBase\)](#) ,
[ValidationRule.Validate\(object, CultureInfo, BindingGroup\)](#) , [ValidationRule.ValidationStep](#) ,
[ValidationRule.ValidatesOnTargetUpdated](#) , [object.ToString\(\)](#) , [object.Equals\(object\)](#) ,
[object.Equals\(object, object\)](#) , [object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) ,
[object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Constructors

DoubleValidationRule()

```
public DoubleValidationRule()
```

Properties

IsRequired

Gets or sets a value indicating whether the input is required.

```
public bool IsRequired { get; set; }
```

Property Value

[bool](#)

Maximum

Gets or sets the maximum allowable value.

```
public double Maximum { get; set; }
```

Property Value

[double](#)

Minimum

Gets or sets the minimum allowable value.

```
public double Minimum { get; set; }
```

Property Value

[double](#)

Methods

Validate(object, CultureInfo)

Validates the input value.

```
public override ValidationResult Validate(object value, CultureInfo cultureInfo)
```

Parameters

value [object](#)

The value to validate.

cultureInfo [CultureInfo](#)

The culture information.

Returns

ValidationResult

A [ValidationResult](#) indicating whether the value is valid.

Class IntegerValidationRule

Namespace: [MBFWpfToolkit.ValidationRules](#)

Assembly: MBFWpfToolkit.dll

Validation rule for integer input with localization support.

```
public class IntegerValidationRule : ValidationRule
```

Inheritance

[object](#) ← [ValidationRule](#) ← IntegerValidationRule

Inherited Members

[ValidationRule.Validate\(object, CultureInfo, BindingExpressionBase\)](#) ,
[ValidationRule.Validate\(object, CultureInfo, BindingGroup\)](#) , [ValidationRule.ValidationStep](#) ,
[ValidationRule.ValidatesOnTargetUpdated](#) , [object.ToString\(\)](#) , [object.Equals\(object\)](#) ,
[object.Equals\(object, object\)](#) , [object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) ,
[object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Constructors

IntegerValidationRule()

```
public IntegerValidationRule()
```

Properties

IsRequired

Gets or sets a value indicating whether the input is required.

```
public bool IsRequired { get; set; }
```

Property Value

[bool](#)

Maximum

Gets or sets the maximum allowable value.

```
public int Maximum { get; set; }
```

Property Value

[int](#)

Minimum

Gets or sets the minimum allowable value.

```
public int Minimum { get; set; }
```

Property Value

[int](#)

Methods

Validate(object, CultureInfo)

Validates the input value.

```
public override ValidationResult Validate(object value, CultureInfo cultureInfo)
```

Parameters

value [object](#)

The value to validate.

cultureInfo [CultureInfo](#)

The culture information.

Returns

ValidationResult

A [ValidationResult](#) indicating whether the value is valid.

Class StringValidationRule

Namespace: [MBFWpfToolkit.ValidationRules](#)

Assembly: MBFWpfToolkit.dll

Validation rule for string input with localization support.

```
public class StringValidationRule : ValidationRule
```

Inheritance

[object](#) ← [ValidationRule](#) ← StringValidationRule

Inherited Members

[ValidationRule.Validate\(object, CultureInfo, BindingExpressionBase\)](#) ,
[ValidationRule.Validate\(object, CultureInfo, BindingGroup\)](#) , [ValidationRule.ValidationStep](#) ,
[ValidationRule.ValidatesOnTargetUpdated](#) , [object.ToString\(\)](#) , [object.Equals\(object\)](#) ,
[object.Equals\(object, object\)](#) , [object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) ,
[object.GetType\(\)](#) , [object.MemberwiseClone\(\)](#)

Constructors

StringValidationRule()

```
public StringValidationRule()
```

Properties

IsRequired

Gets or sets a value indicating whether the input is required.

```
public bool IsRequired { get; set; }
```

Property Value

[bool](#)

MaximumLength

Gets or sets the maximum allowable length.

```
public int MaximumLength { get; set; }
```

Property Value

[int](#)

MinimumLength

Gets or sets the minimum allowable length.

```
public int MinimumLength { get; set; }
```

Property Value

[int](#)

Pattern

Gets or sets the regular expression pattern for validation.

```
public string Pattern { get; set; }
```

Property Value

[string](#)

Methods

Validate(object, CultureInfo)

Validates the input value.

```
public override ValidationResult Validate(object value, CultureInfo cultureInfo)
```

Parameters

value [object](#)

The value to validate.

cultureInfo [CultureInfo](#)

The culture information.

Returns

[ValidationResult](#)

A [ValidationResult](#) indicating whether the value is valid.

Namespace OnMethodBoundaryAspect

Compile

Classes

[MethodInfos](#)

Class MethodInfos

Namespace: [OnMethodBoundaryAspectCompile](#)

Assembly: MBF.Revit.Data.dll

```
public static class MethodInfo
```

Inheritance

[object](#) ← MethodInfo

Inherited Members

[object.ToString\(\)](#) , [object.Equals\(object\)](#) , [object.Equals\(object, object\)](#) ,
[object.ReferenceEquals\(object, object\)](#) , [object.GetHashCode\(\)](#) , [object.GetType\(\)](#) ,
[object.MemberwiseClone\(\)](#)

Fields

methodInfo

00926A69C727F9B22F51721D0444C7537E26479532368E78EAF
25FBBC4507434

```
public static readonly MethodBase  
_methodInfo_00926A69C727F9B22F51721D0444C7537E26479532368E78EAF25FBBC4507434
```

Field Value

[MethodBase](#)

methodInfo

025C0E5F8D4FAF31693CF12C1BDA3042E9947B3A6C75E52E410
01C6D1495FB8E

```
public static readonly MethodBase  
_methodInfo_025C0E5F8D4FAF31693CF12C1BDA3042E9947B3A6C75E52E41001C6D1495FB8E
```

Field Value

[MethodBase](#) ↗

MethodInfo

0307AB59DCDBBDEC5A6BD80A9D2271192EB0CA96CB5C03D7
A5B36B9C1E039B5B

```
public static readonly MethodBase  
_MethodInfo_0307AB59DCDBBDEC5A6BD80A9D2271192EB0CA96CB5C03D7A5B36B9C1E039B5B
```

Field Value

[MethodBase](#) ↗

MethodInfo

033640B222553F4480E6513C4C5BD899A9820D7F310F8B72C38
7FA2A3AF7E003

```
public static readonly MethodBase  
_MethodInfo_033640B222553F4480E6513C4C5BD899A9820D7F310F8B72C387FA2A3AF7E003
```

Field Value

[MethodBase](#) ↗

MethodInfo

03559F3D983F91B89D6E6D6DB8B08CAD618D66C0C60F1B3A7
56CFBB19D19FE1A

```
public static readonly MethodBase  
_MethodInfo_03559F3D983F91B89D6E6D6DB8B08CAD618D66C0C60F1B3A756CFBB19D19FE1A
```

Field Value

[MethodBase](#)

methodInfo
03963C13934E05CA8200A6E1F4D1C8422912F4B7E241A750028
B9A2087E10882

```
public static readonly MethodBase  
_methodInfo_03963C13934E05CA8200A6E1F4D1C8422912F4B7E241A750028B9A2087E10882
```

Field Value

[MethodBase](#)

methodInfo
075D4CC5133076E1F604DB1FEF69CA4030364023E4D9587F4C4
FB4A07EF568E9

```
public static readonly MethodBase  
_methodInfo_075D4CC5133076E1F604DB1FEF69CA4030364023E4D9587F4C4FB4A07EF568E9
```

Field Value

[MethodBase](#)

methodInfo
098712D3C7F2EC76D0468DF812CF1E459B4611F26D7CD1E123
0FCD99022AC34C

```
public static readonly MethodBase  
_methodInfo_098712D3C7F2EC76D0468DF812CF1E459B4611F26D7CD1E1230FCD99022AC34C
```

Field Value

[MethodBase](#)

MethodInfo
0DB308767139FEAAE5F4FA0EFD48B7ECD37A42C84CF560A2FE4
ABE7E35888188

```
public static readonly MethodBase  
_MethodInfo_0DB308767139FEAAE5F4FA0EFD48B7ECD37A42C84CF560A2FE4ABE7E35888188
```

Field Value

[MethodBase](#)

MethodInfo
0DC023FADA715692CF38739E5D810707AA0E40144F2AB4A6BB
C0C4C71578DDCF

```
public static readonly MethodBase  
_MethodInfo_0DC023FADA715692CF38739E5D810707AA0E40144F2AB4A6BBC0C4C71578DDCF
```

Field Value

[MethodBase](#)

MethodInfo
0DC79BC9FB91A6AF7F34F3154A8DB02CAD43A1C17A6DD55B9
704B3B4CF344F90

```
public static readonly MethodBase  
_MethodInfo_0DC79BC9FB91A6AF7F34F3154A8DB02CAD43A1C17A6DD55B9704B3B4CF344F90
```

Field Value

[MethodBase](#)

MethodInfo

0DC82B993C9E6EE88CE96E93488666BA69E51ECD8FDC0FC43A
418264990283C0

```
public static readonly MethodBase
```

```
_MethodInfo_0DC82B993C9E6EE88CE96E93488666BA69E51ECD8FDC0FC43A418264990283C0
```

Field Value

[MethodBase](#) ↗

MethodInfo

0DFF264B24063FE2CDEE0FE89DEA1EA0D210EBE241AB1E3145A
F2B4084CF0FFA

```
public static readonly MethodBase
```

```
_MethodInfo_0DFF264B24063FE2CDEE0FE89DEA1EA0D210EBE241AB1E3145AF2B4084CF0FFA
```

Field Value

[MethodBase](#) ↗

MethodInfo

0EA7D975AAC6A03379DABF0FA17FC555779705B607E6124352
38B124572CAF76

```
public static readonly MethodBase
```

```
_MethodInfo_0EA7D975AAC6A03379DABF0FA17FC555779705B607E612435238B124572CAF76
```

Field Value

[MethodBase](#) ↗

MethodInfo

0FEFF9666CDCF20D385A1031F73E50C890EB307AAE691BD8F1
D46A726A100E8C

```
public static readonly MethodBase
```

```
_MethodInfo_0FEFF9666CDCF20D385A1031F73E50C890EB307AAE691BD8F1D46A726A100E8C
```

Field Value

[MethodBase](#)

MethodInfo

1259011BED77E59AF53F60D9F9E5EC826AB12203AD1E90E5578
0C1574D7C0911

```
public static readonly MethodBase
```

```
_MethodInfo_1259011BED77E59AF53F60D9F9E5EC826AB12203AD1E90E55780C1574D7C0911
```

Field Value

[MethodBase](#)

MethodInfo

141880180FE22F44BA2E262FEC4A182B3EE7199EED4427218412
1B9E825BBD35

```
public static readonly MethodBase
```

```
_MethodInfo_141880180FE22F44BA2E262FEC4A182B3EE7199EED44272184121B9E825BBD35
```

Field Value

[MethodBase](#)

MethodInfo

17711FFA9FB98B8AF3D70EA888112F3A50F0B7574C70BB18770
3933B8D3574DD

```
public static readonly MethodBase
```

```
_MethodInfo_17711FFA9FB98B8AF3D70EA888112F3A50F0B7574C70BB187703933B8D3574DD
```

Field Value

[MethodBase](#) ↗

MethodInfo

18072B2F8069B31F4D609619E913C79BB6E54405CCE89843FF1
D1342DD4C6100

```
public static readonly MethodBase
```

```
_MethodInfo_18072B2F8069B31F4D609619E913C79BB6E54405CCE89843FF1D1342DD4C6100
```

Field Value

[MethodBase](#) ↗

MethodInfo

18621339D7C29B73F84C60AC78528B2B7353D95BB57EEE89524
94B9ED976AEBF

```
public static readonly MethodBase
```

```
_MethodInfo_18621339D7C29B73F84C60AC78528B2B7353D95BB57EEE8952494B9ED976AEBF
```

Field Value

[MethodBase](#) ↗

MethodInfo

1A31276BC0DF532EFB5E6A4ECE333D6F5AD55CBAFEB2619505
358DA8C76AAC47

```
public static readonly MethodBase  
_MethodInfo_1A31276BC0DF532EFB5E6A4ECE333D6F5AD55CBAFEB2619505358DA8C76AAC47
```

Field Value

[MethodBase](#) ↗

MethodInfo

1A6134722B04B7F300BABD39F85D315F01D034847553E408BBB
188D8FBF54054

```
public static readonly MethodBase  
_MethodInfo_1A6134722B04B7F300BABD39F85D315F01D034847553E408BBB188D8FBF54054
```

Field Value

[MethodBase](#) ↗

MethodInfo

1F10853180CB1FC76B0F4E42B2D1E40D209E3B8B19100B199F4
47EDC5BFD6731

```
public static readonly MethodBase  
_MethodInfo_1F10853180CB1FC76B0F4E42B2D1E40D209E3B8B19100B199F447EDC5BFD6731
```

Field Value

[MethodBase](#) ↗

MethodInfo

20DF2AE69E39D9724E9CBE9922D61C0B05B1EFDDD0321FA3DE
ECAF75778DE01B

```
public static readonly MethodBase
```

```
_MethodInfo_20DF2AE69E39D9724E9CBE9922D61C0B05B1EFDDD0321FA3DECAF75778DE01B
```

Field Value

[MethodBase](#) ↗

MethodInfo

23FC48C6486DD71813B1BCCD02233B369392C2206C8A5AA6A
04B3968D57653C3

```
public static readonly MethodBase
```

```
_MethodInfo_23FC48C6486DD71813B1BCCD02233B369392C2206C8A5AA6A04B3968D57653C3
```

Field Value

[MethodBase](#) ↗

MethodInfo

257D4C60713D4891C7B4A5CF85591D907F87280E7FAFF590C2A
034559E0124A4

```
public static readonly MethodBase
```

```
_MethodInfo_257D4C60713D4891C7B4A5CF85591D907F87280E7FAFF590C2A034559E0124A4
```

Field Value

[MethodBase](#) ↗

MethodInfo

27787052737F69877866700B5BE083606971BB24EC32D47AA74
830C11DB7D280

```
public static readonly MethodBase
```

```
_MethodInfo_27787052737F69877866700B5BE083606971BB24EC32D47AA74830C11DB7D280
```

Field Value

[MethodBase](#) ↗

MethodInfo

284ADBAB968A9AE3E7400E03F3B4765A500F817E8E21CB3085F
1C7CE687A8DFA

```
public static readonly MethodBase
```

```
_MethodInfo_284ADBAB968A9AE3E7400E03F3B4765A500F817E8E21CB3085F1C7CE687A8DFA
```

Field Value

[MethodBase](#) ↗

MethodInfo

2A049D6FFD9BAC1A797BC122ACAF9ADA54E5A5EAF3C51031A
BB814873CB8882E

```
public static readonly MethodBase
```

```
_MethodInfo_2A049D6FFD9BAC1A797BC122ACAF9ADA54E5A5EAF3C51031ABB814873CB8882E
```

Field Value

[MethodBase](#) ↗

MethodInfo

2C26759ABE121A937F61D60A88DA275FB183B6514B283388579
7D5B3E620A0F5

```
public static readonly MethodBase
```

```
_MethodInfo_2C26759ABE121A937F61D60A88DA275FB183B6514B2833885797D5B3E620A0F5
```

Field Value

[MethodBase](#) ↗

MethodInfo

2D070094DECE9CB814D325B63CEF30894F0D16C6957D95E09E
760EC6650C7583

```
public static readonly MethodBase
```

```
_MethodInfo_2D070094DECE9CB814D325B63CEF30894F0D16C6957D95E09E760EC6650C7583
```

Field Value

[MethodBase](#) ↗

MethodInfo

2E1040D71846E75E04FFFF59458AE32446BE70F99CB3E1E74825
BEABC8D4E785

```
public static readonly MethodBase
```

```
_MethodInfo_2E1040D71846E75E04FFFF59458AE32446BE70F99CB3E1E74825BEABC8D4E785
```

Field Value

[MethodBase](#) ↗

MethodInfo

305DD05BFB560B2034637AFCC31477DD00551C68473095D78A
5ECAF0F88B1AD8

```
public static readonly MethodBase
```

```
_MethodInfo_305DD05BFB560B2034637AFCC31477DD00551C68473095D78A5ECAF0F88B1AD8
```

Field Value

[MethodBase](#) ↗

MethodInfo

309B221F1A08F43D2EAD5A04FB5B5145958410DE52CC0AF948
5564809E73037E

```
public static readonly MethodBase
```

```
_MethodInfo_309B221F1A08F43D2EAD5A04FB5B5145958410DE52CC0AF9485564809E73037E
```

Field Value

[MethodBase](#) ↗

MethodInfo

312D5642FB6BED601451B12605A85AF3F8F5A534A3862CD581
D3D644350EA447

```
public static readonly MethodBase
```

```
_MethodInfo_312D5642FB6BED601451B12605A85AF3F8F5A534A3862CD581D3D644350EA447
```

Field Value

[MethodBase](#) ↗

MethodInfo

329247C9F82D9FB3B7BAD391539CCD00CA2894D19D8BDCB35
A856599F4E53923

```
public static readonly MethodBase
```

```
_MethodInfo_329247C9F82D9FB3B7BAD391539CCD00CA2894D19D8BDCB35A856599F4E53923
```

Field Value

[MethodBase](#) ↗

MethodInfo

35F16C4396FA7FA25271D83E4903F36224A35ABE88264A3B598
CB746E559D67B

```
public static readonly MethodBase
```

```
_MethodInfo_35F16C4396FA7FA25271D83E4903F36224A35ABE88264A3B598CB746E559D67B
```

Field Value

[MethodBase](#) ↗

MethodInfo

36D98FD2E63F77E2D5BD18735D9255E9254EB90ED82FCB66CB
A0FBB3B4F59699

```
public static readonly MethodBase
```

```
_MethodInfo_36D98FD2E63F77E2D5BD18735D9255E9254EB90ED82FCB66CBA0FBB3B4F59699
```

Field Value

[MethodBase](#) ↗

MethodInfo

37D2C3986EB1F11A514B7C68E46B9F6B98BE6BC783625158CD
CF37B2C6B80395

```
public static readonly MethodBase
```

```
_MethodInfo_37D2C3986EB1F11A514B7C68E46B9F6B98BE6BC783625158CDCF37B2C6B80395
```

Field Value

[MethodBase](#) ↗

MethodInfo

3848E56479F55952EF7D6AB1997838AF02DAE563F5BF138DB24
6F1852EAAAEC

```
public static readonly MethodBase
```

```
_MethodInfo_3848E56479F55952EF7D6AB1997838AF02DAE563F5BF138DB246F1852EAAAEC
```

Field Value

[MethodBase](#) ↗

MethodInfo

3897783CAB23302F21EBA39D32E0EBBD1C87156C1CC8EE812BF
D8F6CB2484992

```
public static readonly MethodBase
```

```
_MethodInfo_3897783CAB23302F21EBA39D32E0EBBD1C87156C1CC8EE812BF8F6CB2484992
```

Field Value

[MethodBase](#) ↗

MethodInfo

3AC1E336FD21D9FB4E7FCB7B1B99EA6B947DC2772AA3B5873F
5A8482BF86C578

```
public static readonly MethodBase
```

```
_MethodInfo_3AC1E336FD21D9FB4E7FCB7B1B99EA6B947DC2772AA3B5873F5A8482BF86C578
```

Field Value

[MethodBase](#) ↗

MethodInfo

3ADBA4ED370B4B4EE2487F01DAE6F44E78C9F6C14284780FA02
A487EA24E4AB3

```
public static readonly MethodBase
```

```
_MethodInfo_3ADBA4ED370B4B4EE2487F01DAE6F44E78C9F6C14284780FA02A487EA24E4AB3
```

Field Value

[MethodBase](#) ↗

MethodInfo

3D003F2BF7C51FB761F364054BFD7D0545918A5D0E6167DA69
C64E7D3D8EBD36

```
public static readonly MethodBase
```

```
_MethodInfo_3D003F2BF7C51FB761F364054BFD7D0545918A5D0E6167DA69C64E7D3D8EBD36
```

Field Value

[MethodBase](#) ↗

MethodInfo

3E83D9D6B365E49E6C47BC10FCDB7ADA46D7BAB9DCC1C798B
29A0A782DA59639

```
public static readonly MethodBase
```

```
_MethodInfo_3E83D9D6B365E49E6C47BC10FCDB7ADA46D7BAB9DCC1C798B29A0A782DA59639
```

Field Value

[MethodBase](#) ↗

MethodInfo

3F7A9DF3C680C78A5E215AE0ADAE0E5D25CB88FFB2211BF681
21C217DCC86DD1

```
public static readonly MethodBase
```

```
_MethodInfo_3F7A9DF3C680C78A5E215AE0ADAE0E5D25CB88FFB2211BF68121C217DCC86DD1
```

Field Value

[MethodBase](#) ↗

MethodInfo

4049C5AD6E585062CB59AC7B2E962CF0D73D3AD4486AE09AD
CECB746C2C72DFF

```
public static readonly MethodBase
```

```
_MethodInfo_4049C5AD6E585062CB59AC7B2E962CF0D73D3AD4486AE09ADCECB746C2C72DFF
```

Field Value

[MethodBase](#) ↗

MethodInfo

4161DB52C52443C53F3AF8182E0A36B1FA1E88D9CA676583481
6CCDE7A5B4937

```
public static readonly MethodBase
```

```
_MethodInfo_4161DB52C52443C53F3AF8182E0A36B1FA1E88D9CA6765834816CCDE7A5B4937
```

Field Value

[MethodBase](#) ↗

MethodInfo

48387F3C93ABA84DA90C920B6E60292A97458168DBE50D5575
27D16E53057317

```
public static readonly MethodBase
```

```
_MethodInfo_48387F3C93ABA84DA90C920B6E60292A97458168DBE50D557527D16E53057317
```

Field Value

[MethodBase](#) ↗

MethodInfo

490FC88971E1FA4342108DB89AD27FCFD7D3CD0BE09A486462
0B06AF3F456C17

```
public static readonly MethodBase
```

```
_MethodInfo_490FC88971E1FA4342108DB89AD27FCFD7D3CD0BE09A4864620B06AF3F456C17
```

Field Value

[MethodBase](#) ↗

MethodInfo

496EFEDD626409BE0A2DABE954ABF1830053DA12A61D1F453F
D6A82C76D9849C

```
public static readonly MethodBase
```

```
_MethodInfo_496EFEDD626409BE0A2DABE954ABF1830053DA12A61D1F453FD6A82C76D9849C
```

Field Value

[MethodBase](#) ↗

MethodInfo

4BA10E4FA39E251203927CD0A1E2CB47839F7091CE9CAAAAE2
F20BFDB6809EF3

```
public static readonly MethodBase
```

```
_MethodInfo_4BA10E4FA39E251203927CD0A1E2CB47839F7091CE9CAAAAE2F20BFDB6809EF3
```

Field Value

[MethodBase](#) ↗

MethodInfo

4CD2A9EDFEB2456C6D47D22EECCFD5B2EF487F8C0A76D9AA8
EEECB523EE70A3F

```
public static readonly MethodBase
```

```
_MethodInfo_4CD2A9EDFEB2456C6D47D22EECCFD5B2EF487F8C0A76D9AA8EEECB523EE70A3F
```

Field Value

[MethodBase](#) ↗

MethodInfo

51CC96F7C0E870857E01161C48A61552D6B048E2D61A1735968

58541B29C6A62

```
public static readonly MethodBase
```

```
_MethodInfo_51CC96F7C0E870857E01161C48A61552D6B048E2D61A173596858541B29C6A62
```

Field Value

[MethodBase](#) ↗

MethodInfo

55CC5678BE31DD77603A674D10D7A50C8845DC5D56BE18249

315AF8B4C181BA6

```
public static readonly MethodBase
```

```
_MethodInfo_55CC5678BE31DD77603A674D10D7A50C8845DC5D56BE18249315AF8B4C181BA6
```

Field Value

[MethodBase](#) ↗

MethodInfo

56C5436FAA39D5D13649CFE357B8307A5ADFB94495D8268A0

2E602B31C3B934

```
public static readonly MethodBase
```

```
_MethodInfo_56C5436FAA39D5D13649CFE357B8307A5ADFB94495D8268A02E602B31C3B934
```

Field Value

[MethodBase](#) ↗

MethodInfo

5796ED30EE1730D99C0A9FDCA1A5E6757ACA2B96069FB4BD4
DEE128A565842C0

```
public static readonly MethodBase
```

```
_MethodInfo_5796ED30EE1730D99C0A9FDCA1A5E6757ACA2B96069FB4BD4DEE128A565842C0
```

Field Value

[MethodBase](#) ↗

MethodInfo

5B581CA2DAA49B2F1E46CBFBBC44349ECA669F9BA49294C087
9D7034781E240E

```
public static readonly MethodBase
```

```
_MethodInfo_5B581CA2DAA49B2F1E46CBFBBC44349ECA669F9BA49294C0879D7034781E240E
```

Field Value

[MethodBase](#) ↗

MethodInfo

5C36D2D816F6748DF83581A561F5CCB133A2841FBEA6920B6FE
14FB56F027A0C

```
public static readonly MethodBase
```

```
_MethodInfo_5C36D2D816F6748DF83581A561F5CCB133A2841FBEA6920B6FE14FB56F027A0C
```

Field Value

[MethodBase](#) ↗

MethodInfo

5E724CC5D1C66F9913C5F95211DA1517602F9D2AFB0C8EDF36
7064C91E03E436

```
public static readonly MethodBase
```

```
_MethodInfo_5E724CC5D1C66F9913C5F95211DA1517602F9D2AFB0C8EDF367064C91E03E436
```

Field Value

[MethodBase](#) ↗

MethodInfo

60967AB4825B36AD4BFCFC0C4562FDEFAF231BC9D8FC610AD1
25DF9663E13F86

```
public static readonly MethodBase
```

```
_MethodInfo_60967AB4825B36AD4BFCFC0C4562FDEFAF231BC9D8FC610AD125DF9663E13F86
```

Field Value

[MethodBase](#) ↗

MethodInfo

6162A67781438A37532CAEE6E3579DA2B02951C588B8AFBB9B
121ED0F06806A7

```
public static readonly MethodBase
```

```
_MethodInfo_6162A67781438A37532CAEE6E3579DA2B02951C588B8AFBB9B121ED0F06806A7
```

Field Value

[MethodBase](#) ↗

MethodInfo

6255A9AD75AD08C173FC23454EC2170EF1AE3D00568223C848
58B2A119B2F539

```
public static readonly MethodBase
```

```
_MethodInfo_6255A9AD75AD08C173FC23454EC2170EF1AE3D00568223C84858B2A119B2F539
```

Field Value

[MethodBase](#) ↗

MethodInfo

64067E9ED11044837486E24C376F5C44138F9DBFB1336B1809D
8AC7C437B8670

```
public static readonly MethodBase
```

```
_MethodInfo_64067E9ED11044837486E24C376F5C44138F9DBFB1336B1809D8AC7C437B8670
```

Field Value

[MethodBase](#) ↗

MethodInfo

68A268DC8F7D72862EDD48553DECC8F6645C2D6CB4E117D2E
56C8B0486666CDC

```
public static readonly MethodBase
```

```
_MethodInfo_68A268DC8F7D72862EDD48553DECC8F6645C2D6CB4E117D2E56C8B0486666CDC
```

Field Value

[MethodBase](#) ↗

MethodInfo

68E0097A3F8686D7FE9D30B862E84636CFAAB56E92FD32D513FD330B7856F0EE

```
public static readonly MethodBase
```

```
_MethodInfo_68E0097A3F8686D7FE9D30B862E84636CFAAB56E92FD32D513FD330B7856F0EE
```

Field Value

[MethodBase](#) ↗

MethodInfo

71CBE84D81D9DBFDC641B515C7E57DCF057A4D48B21AA50A5F4CE76AB41B5809

```
public static readonly MethodBase
```

```
_MethodInfo_71CBE84D81D9DBFDC641B515C7E57DCF057A4D48B21AA50A5F4CE76AB41B5809
```

Field Value

[MethodBase](#) ↗

MethodInfo

73EC350BE0A84A5EFA90914FBCA3043D3B19D91E3D31151E14757E88DD6DB7F5

```
public static readonly MethodBase
```

```
_MethodInfo_73EC350BE0A84A5EFA90914FBCA3043D3B19D91E3D31151E14757E88DD6DB7F5
```

Field Value

[MethodBase](#) ↗

MethodInfo

74907F38FD4A684572B900A878DC53C2D6D2DBF1D35729EA1
D4884D911B7D3E6

```
public static readonly MethodBase  
_MethodInfo_74907F38FD4A684572B900A878DC53C2D6D2DBF1D35729EA1D4884D911B7D3E6
```

Field Value

[MethodBase](#) ↗

MethodInfo

7531B87CE8ED69DC1BB447611EA4A36614956EF7028D4DF133
2E7897935EAD7E

```
public static readonly MethodBase  
_MethodInfo_7531B87CE8ED69DC1BB447611EA4A36614956EF7028D4DF1332E7897935EAD7E
```

Field Value

[MethodBase](#) ↗

MethodInfo

757D5500E5E06B210B2B251C9322659AE1445BF515BE04342DF
EBF8BFD8BFE6F

```
public static readonly MethodBase  
_MethodInfo_757D5500E5E06B210B2B251C9322659AE1445BF515BE04342DFEBF8BFD8BFE6F
```

Field Value

[MethodBase](#) ↗

MethodInfo

77DEC956CB4EB58000E5D50ECB122B76B102228788B53FFCECB
31E7CA7601C14

```
public static readonly MethodBase
```

```
_MethodInfo_77DEC956CB4EB58000E5D50ECB122B76B102228788B53FFCECB31E7CA7601C14
```

Field Value

[MethodBase](#) ↗

MethodInfo

7C0E9B811FF2665D74979DAD4A1E178ED09A5EBEFFB76962888
736CD4433AA99

```
public static readonly MethodBase
```

```
_MethodInfo_7C0E9B811FF2665D74979DAD4A1E178ED09A5EBEFFB76962888736CD4433AA99
```

Field Value

[MethodBase](#) ↗

MethodInfo

7CBF202FAD78B999FEB6EF9638F1F37AA3CBE05691B51C1FD65
FEEA8F41C2C41

```
public static readonly MethodBase
```

```
_MethodInfo_7CBF202FAD78B999FEB6EF9638F1F37AA3CBE05691B51C1FD65FEEA8F41C2C41
```

Field Value

[MethodBase](#) ↗

MethodInfo

7F8DEB88993DD246B8126324B21DA07C9EC283D8A54BE5820D
300B3BFEB5AE20

```
public static readonly MethodBase  
_MethodInfo_7F8DEB88993DD246B8126324B21DA07C9EC283D8A54BE5820D300B3BFEB5AE20
```

Field Value

[MethodBase](#) ↗

MethodInfo

81B8ADED32995BA3F683D332F624D943A795346955AB993273
DE5A103DDE02D0

```
public static readonly MethodBase  
_MethodInfo_81B8ADED32995BA3F683D332F624D943A795346955AB993273DE5A103DDE02D0
```

Field Value

[MethodBase](#) ↗

MethodInfo

827463E519E73D84DBBF5E2C8CFCEDD6CFFCB78559E21EBFA67
6ABD053DD380E

```
public static readonly MethodBase  
_MethodInfo_827463E519E73D84DBBF5E2C8CFCEDD6CFFCB78559E21EBFA676ABD053DD380E
```

Field Value

[MethodBase](#) ↗

MethodInfo

8317B9CA16FA34298CBBFA3038FD1074CD829A5F7897F7055A
8187675E80D75E

```
public static readonly MethodBase
```

```
_MethodInfo_8317B9CA16FA34298CBBFA3038FD1074CD829A5F7897F7055A8187675E80D75E
```

Field Value

[MethodBase](#) ↗

MethodInfo

85DE62FBC84DD2B8E17C545E5682709982CBE615A1616EBE70E
DFE6B896B70F6

```
public static readonly MethodBase
```

```
_MethodInfo_85DE62FBC84DD2B8E17C545E5682709982CBE615A1616EBE70EDFE6B896B70F6
```

Field Value

[MethodBase](#) ↗

MethodInfo

86918767DC224811D24EEF54CEAE0AFE8014E3FAA8016F8EB88
7534E657CD381

```
public static readonly MethodBase
```

```
_MethodInfo_86918767DC224811D24EEF54CEAE0AFE8014E3FAA8016F8EB887534E657CD381
```

Field Value

[MethodBase](#) ↗

MethodInfo

888FA8F9D4B2B5AF79C3DA20FC7658F1772E0B8C0FE8FC53C06
2A9C31BF901FB

```
public static readonly MethodBase
```

```
_MethodInfo_888FA8F9D4B2B5AF79C3DA20FC7658F1772E0B8C0FE8FC53C062A9C31BF901FB
```

Field Value

[MethodBase](#) ↗

MethodInfo

8E17D2207E80F4D7F0158715A3DCAA82DED80BC71C6F7B9
BC57C7B684E3A7F

```
public static readonly MethodBase
```

```
_MethodInfo_8E17D2207E80F4D7F0158715A3DCAA82DED80BC71C6F7B9BC57C7B684E3A7F
```

Field Value

[MethodBase](#) ↗

MethodInfo

8E65A719FFE2DBC1BDB51B93789657AC8EF97E201E40E62C168
8820B93AB8C59

```
public static readonly MethodBase
```

```
_MethodInfo_8E65A719FFE2DBC1BDB51B93789657AC8EF97E201E40E62C1688820B93AB8C59
```

Field Value

[MethodBase](#) ↗

MethodInfo

8ED0C385C0E87884C83D5B689CD6B2ABDD5E0FA3DC147FB8A
CEED2584949E025

```
public static readonly MethodBase
```

```
_MethodInfo_8ED0C385C0E87884C83D5B689CD6B2ABDD5E0FA3DC147FB8ACEED2584949E025
```

Field Value

[MethodBase](#) ↗

MethodInfo

910389CCE732FA6F506E23555EF929F637A74E2B5E13F7CE4597
E83F5DE67160

```
public static readonly MethodBase
```

```
_MethodInfo_910389CCE732FA6F506E23555EF929F637A74E2B5E13F7CE4597E83F5DE67160
```

Field Value

[MethodBase](#) ↗

MethodInfo

924199C155BD01B37CBABB2D090EAA60AA18EC038C4981D9A
B62791616E5779A

```
public static readonly MethodBase
```

```
_MethodInfo_924199C155BD01B37CBABB2D090EAA60AA18EC038C4981D9AB62791616E5779A
```

Field Value

[MethodBase](#) ↗

MethodInfo

92DCE9FD6FFAE8435DD080E38E182FC2484CA583D67788A720
3559B3ACB229F0

```
public static readonly MethodBase
```

```
_MethodInfo_92DCE9FD6FFAE8435DD080E38E182FC2484CA583D67788A7203559B3ACB229F0
```

Field Value

[MethodBase](#) ↗

MethodInfo

951DF4346665FA7BE08345A85A235C0B4B9CBEE47BE88B8AAB2
1EB85C00CD120

```
public static readonly MethodBase
```

```
_MethodInfo_951DF4346665FA7BE08345A85A235C0B4B9CBEE47BE88B8AAB21EB85C00CD120
```

Field Value

[MethodBase](#) ↗

MethodInfo

95C5F545ADF1A13E341B8A1AC9D5E7BEC536BCFAA04A1835E7
867A7D6D9779C9

```
public static readonly MethodBase
```

```
_MethodInfo_95C5F545ADF1A13E341B8A1AC9D5E7BEC536BCFAA04A1835E7867A7D6D9779C9
```

Field Value

[MethodBase](#) ↗

MethodInfo

95CE5D6F74EB60FE1C2F0000A636913FFD0C006CDBA5BFCD7E
5917314AE13014

```
public static readonly MethodBase
```

```
_MethodInfo_95CE5D6F74EB60FE1C2F0000A636913FFD0C006CDBA5BFCD7E5917314AE13014
```

Field Value

[MethodBase](#) ↗

MethodInfo

95DF7CF7655392DBD62955E98545A082894A656C7622C1C321
C1F9790104528F

```
public static readonly MethodBase
```

```
_MethodInfo_95DF7CF7655392DBD62955E98545A082894A656C7622C1C321C1F9790104528F
```

Field Value

[MethodBase](#) ↗

MethodInfo

96CEC655D6F8BAA7AA8AA60EFE45C6BB79BA1CBAFB3164D5FF
FF3B55E7E1845B

```
public static readonly MethodBase
```

```
_MethodInfo_96CEC655D6F8BAA7AA8AA60EFE45C6BB79BA1CBAFB3164D5FFFF3B55E7E1845B
```

Field Value

[MethodBase](#) ↗

MethodInfo

97B65AA5E03C39535AE4079AE7D8F210AF8DB427A031BC6E11
E0D7896627A496

```
public static readonly MethodBase
```

```
_MethodInfo_97B65AA5E03C39535AE4079AE7D8F210AF8DB427A031BC6E11E0D7896627A496
```

Field Value

[MethodBase](#) ↗

MethodInfo

9B7B2B5650338508BBBA2F4F33462BBE2CD34F86BC39BDA16A
5890F95E94E794

```
public static readonly MethodBase
```

```
_MethodInfo_9B7B2B5650338508BBBA2F4F33462BBE2CD34F86BC39BDA16A5890F95E94E794
```

Field Value

[MethodBase](#) ↗

MethodInfo

9F956B16D74F4F74FF54539A0CE204A23B569412CEE8C4DDA8
DA30B445B8DFDB

```
public static readonly MethodBase
```

```
_MethodInfo_9F956B16D74F4F74FF54539A0CE204A23B569412CEE8C4DDA8DA30B445B8DFDB
```

Field Value

[MethodBase](#) ↗

MethodInfo

9FEDE3781E71415329749F7965467615325BDF32367255B6FF15
B88E0C152AD9

```
public static readonly MethodBase
```

```
_MethodInfo_9FEDE3781E71415329749F7965467615325BDF32367255B6FF15B88E0C152AD9
```

Field Value

[MethodBase](#) ↗

MethodInfo

A0CCB7AC7AC56B2958B6EDB5B8D000562E47C13D508A1A099
4989CAF8684C9B3

```
public static readonly MethodBase
```

```
_MethodInfo_A0CCB7AC7AC56B2958B6EDB5B8D000562E47C13D508A1A0994989CAF8684C9B3
```

Field Value

[MethodBase](#) ↗

MethodInfo

A71B48C493D29E2B8313E53FD0672C4DBA5A075AF264536B3A
67D76FBCE1A69E

```
public static readonly MethodBase
```

```
_MethodInfo_A71B48C493D29E2B8313E53FD0672C4DBA5A075AF264536B3A67D76FBCE1A69E
```

Field Value

[MethodBase](#) ↗

MethodInfo

A88A393F05B0C66FAB35F01219639BDA73345531A8E206C3DC
DB837FAD087523

```
public static readonly MethodBase
```

```
_MethodInfo_A88A393F05B0C66FAB35F01219639BDA73345531A8E206C3DCDB837FAD087523
```

Field Value

[MethodBase](#) ↗

MethodInfo

AA41412B6914A1029549AD828D9CAEAFFEAA2565561D40AF2
F915CCDCA72EF0

```
public static readonly MethodBase
```

```
_MethodInfo_AA41412B6914A1029549AD828D9CAEAFFEAA2565561D40AF2F915CCDCA72EF0
```

Field Value

[MethodBase](#) ↗

MethodInfo

AA6641528531770FCCEF8C2F662F6EB05FB0E046BE6EB6123BB1
00960166FBB6

```
public static readonly MethodBase
```

```
_MethodInfo_AA6641528531770FCCEF8C2F662F6EB05FB0E046BE6EB6123BB100960166FBB6
```

Field Value

[MethodBase](#) ↗

MethodInfo

ADA1196B8A850AB3A195806E7D910AB955BC230B7D7FB2A22
5F8D5206E38F069

`public static readonly MethodBase`

`_MethodInfo_ADA1196B8A850AB3A195806E7D910AB955BC230B7D7FB2A225F8D5206E38F069`

Field Value

[MethodBase](#)

MethodInfo

AF6E25137F6450D8EB4BB3213F5ACE06EA52A9E36F3A167797E
BD1CBA3828681

`public static readonly MethodBase`

`_MethodInfo_AF6E25137F6450D8EB4BB3213F5ACE06EA52A9E36F3A167797EBD1CBA3828681`

Field Value

[MethodBase](#)

MethodInfo

B1B36F8B8B78EFF9E4059277CE22BA9323185B8976FB8E02C08B
7F1C219BBBF0

`public static readonly MethodBase`

`_MethodInfo_B1B36F8B8B78EFF9E4059277CE22BA9323185B8976FB8E02C08B7F1C219BBBF0`

Field Value

[MethodBase](#)

MethodInfo

B2FCA7D4EF4BCA937F11B8D504BEFB89B82503D0C83D409B79
211CB9CA303CA1

```
public static readonly MethodBase
```

```
_MethodInfo_B2FCA7D4EF4BCA937F11B8D504BEFB89B82503D0C83D409B79211CB9CA303CA1
```

Field Value

[MethodBase](#) ↗

MethodInfo

B32DC168442CB323C6225D4A7250318C43E03839A4E1F9251F5
C8A5FB96143BD

```
public static readonly MethodBase
```

```
_MethodInfo_B32DC168442CB323C6225D4A7250318C43E03839A4E1F9251F5C8A5FB96143BD
```

Field Value

[MethodBase](#) ↗

MethodInfo

BC0E01DDF9582F39E20DAAA90E5195FFCC663483B3698600D6
784FD6853417EA

```
public static readonly MethodBase
```

```
_MethodInfo_BC0E01DDF9582F39E20DAAA90E5195FFCC663483B3698600D6784FD6853417EA
```

Field Value

[MethodBase](#) ↗

MethodInfo

BEAAE601ADA2FB44C138B59FE3B15784E2CCC9759050131AFD
FFA91CDBE0C4FF

```
public static readonly MethodBase
```

```
_MethodInfo_BEAAE601ADA2FB44C138B59FE3B15784E2CCC9759050131AFDFFA91CDBE0C4FF
```

Field Value

[MethodBase](#) ↗

MethodInfo

BED2CBD1D721B6771AFFE3AA64A169E52FD1C2B4171A966D5
0AC5695AFDCE30E

```
public static readonly MethodBase
```

```
_MethodInfo_BED2CBD1D721B6771AFFE3AA64A169E52FD1C2B4171A966D50AC5695AFDCE30E
```

Field Value

[MethodBase](#) ↗

MethodInfo

C10D89EA5D145AD5AE6E86A3073BFFA9D03EE8EDD2A8785E09
168EC35A4BD982

```
public static readonly MethodBase
```

```
_MethodInfo_C10D89EA5D145AD5AE6E86A3073BFFA9D03EE8EDD2A8785E09168EC35A4BD982
```

Field Value

[MethodBase](#) ↗

MethodInfo

C4071C8024CEA028B080B887AE95502EE04771BA7A3F0711DA

C2B879E57DD7E6

```
public static readonly MethodBase
```

```
_MethodInfo_C4071C8024CEA028B080B887AE95502EE04771BA7A3F0711DAC2B879E57DD7E6
```

Field Value

[MethodBase](#) ↗

MethodInfo

C43C0FF907E451510298562252E3C0DA7776E4CA61102D3477D

DFF8D5498BBC9

```
public static readonly MethodBase
```

```
_MethodInfo_C43C0FF907E451510298562252E3C0DA7776E4CA61102D3477DDFF8D5498BBC9
```

Field Value

[MethodBase](#) ↗

MethodInfo

C960821796BFF9CE832EB534336C3E32E7A2C5B65B417E6B888

91450826DBE8E

```
public static readonly MethodBase
```

```
_MethodInfo_C960821796BFF9CE832EB534336C3E32E7A2C5B65B417E6B88891450826DBE8E
```

Field Value

[MethodBase](#) ↗

MethodInfo

CA581EDD7CAE880EEBF873600E5859CC774954D16A4561C0DA
5AB62543CCAE19

```
public static readonly MethodBase
```

```
_MethodInfo_CA581EDD7CAE880EEBF873600E5859CC774954D16A4561C0DA5AB62543CCAE19
```

Field Value

[MethodBase](#) ↗

MethodInfo

CA87307C56C9E1E3D912279E50D2CFDD521DCA453B543F3371
229D8EE5671C29

```
public static readonly MethodBase
```

```
_MethodInfo_CA87307C56C9E1E3D912279E50D2CFDD521DCA453B543F3371229D8EE5671C29
```

Field Value

[MethodBase](#) ↗

MethodInfo

CB3F1739354E1CEC89D3D6E66DEF60BA13D2EDF6434468DE4C
D96CFD4B2C60F3

```
public static readonly MethodBase
```

```
_MethodInfo_CB3F1739354E1CEC89D3D6E66DEF60BA13D2EDF6434468DE4CD96CFD4B2C60F3
```

Field Value

[MethodBase](#) ↗

MethodInfo

D34085B3DCF65D6BA44D9572511A0DD1720F7E6AFFA231143E
62B3624899959F

```
public static readonly MethodBase  
_MethodInfo_D34085B3DCF65D6BA44D9572511A0DD1720F7E6AFFA231143E62B3624899959F
```

Field Value

[MethodBase](#) ↗

MethodInfo

D45F84FB061F5B15F0EBC89456A26A24AC5CE85B96E57D211B4
2CC51026BA87E

```
public static readonly MethodBase  
_MethodInfo_D45F84FB061F5B15F0EBC89456A26A24AC5CE85B96E57D211B42CC51026BA87E
```

Field Value

[MethodBase](#) ↗

MethodInfo

D514A7D65C13A227F532539AEF3A6C7449A4845667BD239F75
E790EEBA9BF21F

```
public static readonly MethodBase  
_MethodInfo_D514A7D65C13A227F532539AEF3A6C7449A4845667BD239F75E790EEBA9BF21F
```

Field Value

[MethodBase](#) ↗

MethodInfo

D6785CDCA700815C4B1A3AE597ACC10854DDAA068E2CC3513
50271CDAA9F7499

```
public static readonly MethodBase
```

```
_MethodInfo_D6785CDCA700815C4B1A3AE597ACC10854DDAA068E2CC351350271CDAA9F7499
```

Field Value

[MethodBase](#) ↗

MethodInfo

D81AF4E4CFA71784C60746C550B0ED46FF7A9E5A9BA8283B19
2662714E03B8C5

```
public static readonly MethodBase
```

```
_MethodInfo_D81AF4E4CFA71784C60746C550B0ED46FF7A9E5A9BA8283B192662714E03B8C5
```

Field Value

[MethodBase](#) ↗

MethodInfo

D964B570E1581B1B9DCC7E0D14FA0539AACECE51B92981095D
02501F02BF1AD5

```
public static readonly MethodBase
```

```
_MethodInfo_D964B570E1581B1B9DCC7E0D14FA0539AACECE51B92981095D02501F02BF1AD5
```

Field Value

[MethodBase](#) ↗

MethodInfo

DB09760076BE208ED462C4A855178CE82AC2647757516F63E71
9565E1C1A163B

```
public static readonly MethodBase
```

```
_MethodInfo_DB09760076BE208ED462C4A855178CE82AC2647757516F63E719565E1C1A163B
```

Field Value

[MethodBase](#) ↗

MethodInfo

E068B872A0E710683067E72834E5056A8fbe0243a2f2f6b3443d
204ab96ac8c2

```
public static readonly MethodBase
```

```
_MethodInfo_E068B872A0E710683067E72834E5056A8fbe0243a2f2f6b3443d204ab96ac8c2
```

Field Value

[MethodBase](#) ↗

MethodInfo

E07E4475F5980AF3694FA4BD0C03895EFCA3FD67475906C0F7A
B36A0F5CAF137

```
public static readonly MethodBase
```

```
_MethodInfo_E07E4475F5980AF3694FA4BD0C03895EFCA3FD67475906C0F7AB36A0F5CAF137
```

Field Value

[MethodBase](#) ↗

MethodInfo

E1A365361DABCF1AEC171889C09D6577F919E03755E3625C626
4EDDC307941DC

```
public static readonly MethodBase
```

```
_MethodInfo_E1A365361DABCF1AEC171889C09D6577F919E03755E3625C6264EDDC307941DC
```

Field Value

[MethodBase](#) ↗

MethodInfo

E280D82A35D9D5D898A998155946B2B45A41925362BC067863
68B6E88234C643

```
public static readonly MethodBase
```

```
_MethodInfo_E280D82A35D9D5D898A998155946B2B45A41925362BC06786368B6E88234C643
```

Field Value

[MethodBase](#) ↗

MethodInfo

E3AB0331CCDF2E7A25C604FD26DB630D72C3E0E6C0E9A4B474
4A04D37B0DEF0E

```
public static readonly MethodBase
```

```
_MethodInfo_E3AB0331CCDF2E7A25C604FD26DB630D72C3E0E6C0E9A4B4744A04D37B0DEF0E
```

Field Value

[MethodBase](#) ↗

MethodInfo

E6F19F65608A57E3BA33CAE219AF30C14B39B83DA1E5DCE97D
235E21DA90A902

```
public static readonly MethodBase
```

```
_MethodInfo_E6F19F65608A57E3BA33CAE219AF30C14B39B83DA1E5DCE97D235E21DA90A902
```

Field Value

[MethodBase](#) ↗

MethodInfo

E809BFD7BC171C1A96D81D1C98C22FF04F189B5BB3F887DF65
85D998825354A7

```
public static readonly MethodBase
```

```
_MethodInfo_E809BFD7BC171C1A96D81D1C98C22FF04F189B5BB3F887DF6585D998825354A7
```

Field Value

[MethodBase](#) ↗

MethodInfo

E96F03E911A9D4913B42E6F041AF6F6E2962B316599354088704
01DB5AB47128

```
public static readonly MethodBase
```

```
_MethodInfo_E96F03E911A9D4913B42E6F041AF6F6E2962B31659935408870401DB5AB47128
```

Field Value

[MethodBase](#) ↗

MethodInfo

EAF464C41BC997B1D064E17AECA884BCA279989D98EB99624B
658268F9D18D5A

```
public static readonly MethodBase
```

```
_MethodInfo_EAF464C41BC997B1D064E17AECA884BCA279989D98EB99624B658268F9D18D5A
```

Field Value

[MethodBase](#) ↗

MethodInfo

EC6DD8B7AA1DE3636CBDCC351A92CC8CE4B09951CE2A531F3
4EDB6E2CD16E8B8

```
public static readonly MethodBase
```

```
_MethodInfo_EC6DD8B7AA1DE3636CBDCC351A92CC8CE4B09951CE2A531F34EDB6E2CD16E8B8
```

Field Value

[MethodBase](#) ↗

MethodInfo

EDC0BF1984D9EF7468BC71BB5C6C2D586DCAAF91516E7EC941
81F5398003CDFC

```
public static readonly MethodBase
```

```
_MethodInfo_EDC0BF1984D9EF7468BC71BB5C6C2D586DCAAF91516E7EC94181F5398003CDFC
```

Field Value

[MethodBase](#) ↗

MethodInfo

EFF4B3C5A4230E038B5B65BC0A407511957F5E4060CC3759E73
9207D6EA6137E

```
public static readonly MethodBase
```

```
_MethodInfo_EFF4B3C5A4230E038B5B65BC0A407511957F5E4060CC3759E739207D6EA6137E
```

Field Value

[MethodBase](#) ↗

MethodInfo

F0839477CEC4CE77C74A246DFA453507D0121044946BD937D8
EB38D1674E8F38

```
public static readonly MethodBase
```

```
_MethodInfo_F0839477CEC4CE77C74A246DFA453507D0121044946BD937D8EB38D1674E8F38
```

Field Value

[MethodBase](#) ↗

MethodInfo

F2325D2528F704559D29C5E23E061F6580F189B554C81D5AC16
AF9194BBFE042

```
public static readonly MethodBase
```

```
_MethodInfo_F2325D2528F704559D29C5E23E061F6580F189B554C81D5AC16AF9194BBFE042
```

Field Value

[MethodBase](#) ↗

MethodInfo

F24DCA2381B2D98C489692DC777C126009CA6D8AC84D4AA70
9E079676B9E3C29

```
public static readonly MethodBase
```

```
_MethodInfo_F24DCA2381B2D98C489692DC777C126009CA6D8AC84D4AA709E079676B9E3C29
```

Field Value

[MethodBase](#) ↗

MethodInfo

F2BF83676BB38EF604978D5240CF22EEA2FC972254ABED88A3F
F81BD601470C0

```
public static readonly MethodBase
```

```
_MethodInfo_F2BF83676BB38EF604978D5240CF22EEA2FC972254ABED88A3FF81BD601470C0
```

Field Value

[MethodBase](#) ↗

MethodInfo

F41D9675F1EF4AEA36860DF367B2AC64B163B7661F5C73AC149
066CC9CDD4ADC

```
public static readonly MethodBase
```

```
_MethodInfo_F41D9675F1EF4AEA36860DF367B2AC64B163B7661F5C73AC149066CC9CDD4ADC
```

Field Value

[MethodBase](#) ↗

MethodInfo

F4A0B5B9BF29DC813F8DA933EE473BB9DD7688B89DB438D952
14105AE56BE56B

```
public static readonly MethodBase
```

```
_MethodInfo_F4A0B5B9BF29DC813F8DA933EE473BB9DD7688B89DB438D95214105AE56BE56B
```

Field Value

[MethodBase](#)

MethodInfo

F5C2E9EBDC94D456522B014D502F383F84D3B6F5EDEF04A2AA
CFC784AABAEA61

```
public static readonly MethodBase
```

```
_MethodInfo_F5C2E9EBDC94D456522B014D502F383F84D3B6F5EDEF04A2AACFC784AABAEA61
```

Field Value

[MethodBase](#)

MethodInfo

F718D5FF2C33CF1CB479ADF2FBFEB08C668BF66B4796B0FBF94
6D461618CC939

```
public static readonly MethodBase
```

```
_MethodInfo_F718D5FF2C33CF1CB479ADF2FBFEB08C668BF66B4796B0FBF946D461618CC939
```

Field Value

[MethodBase](#)

MethodInfo

F9E272D3B1CF088FEAE5CDFE1FE92BCF49EC71F429484ADD81A
6030CDD7C3FD5

```
public static readonly MethodBase
```

```
_MethodInfo_F9E272D3B1CF088FEAE5CDFE1FE92BCF49EC71F429484ADD81A6030CDD7C3FD5
```

Field Value

[MethodBase](#) ↗

MethodInfo

FA673C61C4D1DCDEDE59EB7E95A6F1730A8281F83920AE58BD
79E765B5A395EB

```
public static readonly MethodBase
```

```
_MethodInfo_FA673C61C4D1DCDEDE59EB7E95A6F1730A8281F83920AE58BD79E765B5A395EB
```

Field Value

[MethodBase](#) ↗

MethodInfo

FD409DDCCC651A9A2BE2654B0D6DBF60513902E70EEF82C7A2
C662536D4699EB

```
public static readonly MethodBase
```

```
_MethodInfo_FD409DDCCC651A9A2BE2654B0D6DBF60513902E70EEF82C7A2C662536D4699EB
```

Field Value

[MethodBase](#) ↗

`_MethodInfo_`

FD69BAB8E1946BA5283192625983D8AE5332A9FE151C8C23E6E
E655AFDB1C418

`public static readonly MethodBase`

`_MethodInfo_FD69BAB8E1946BA5283192625983D8AE5332A9FE151C8C23E6EE655AFDB1C418`

Field Value

[MethodBase](#) ↗