

**Git Ref:** master  
**Date:** 2020-05-18  
**Revises:** master  
**Reply at:** <https://github.com/johelegp/jegp/issues>

## JEGP Library

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# 1 Scope

[scope]

<sup>1</sup> This document describes the contents of the *JEGP library*.

## 2 References

[refs]

<sup>1</sup> The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

(1.1) — ISO/IEC 14882:2020, *Programming Languages — C++*

<sup>2</sup> ISO/IEC 14882 is herein called the *C++ Standard*.

## 3 Introduction

[intro]

### 3.1 General

[intro.general]

- <sup>1</sup> The library specification subsumes the C++ Standard's [library], assumingly amended to the context of this library. [*Example*:
- (1.1) — Per C++ Standard's [namespace.future], `::jpeg2` is reserved.
  - (1.2) — Per C++ Standard's [contents]#3, a name `x` means `::jpeg::x`.
- *end example*] The following subclauses describe additions to it.

Table 1: Library categories [tab:library.categories]

| Clause                   | Category                  |
|--------------------------|---------------------------|
| <a href="#">Clause 4</a> | General utilities library |

### 3.2 Library-wide requirements

[requirements]

#### 3.2.1 Library contents

[contents]

- <sup>1</sup> Whenever a name is qualified with `X::`, `::X::` is meant. [*Example*: When `std::Y` is mentioned, `::std::Y` is meant. — *end example*]

#### 3.2.2 Reserved names

[reserved.names]

- <sup>1</sup> The JEGP library reserves macro names starting with `JEGP_`.

## 4 General utilities library

[utilities]

### 4.1 General

[utilities.general]

- <sup>1</sup> This clause describes generally useful utilities. These utilities are summarized in [Table 2](#).

Table 2: General utilities library summary [tab:utilities.summary]

| Subclause                              | Header             |
|----------------------------------------|--------------------|
| <a href="#">4.2</a> Utility components | <jegp/utility.hpp> |

### 4.2 Utility components

[utility]

#### 4.2.1 Header <jegp/utility.hpp> synopsis

[utility.syn]

- <sup>1</sup> The header <jegp/utility.hpp> contains some basic constructs.

```
namespace jegp
{
    // 4.2.2, underlying
    template <class Enum>
    constexpr std::underlying_type_t<Enum> underlying(Enum e) noexcept;

    // 4.2.3, static_downcast
    template <class DerivedRef, class Base>
    constexpr DerivedRef static_downcast(Base&& base) noexcept;

    // 4.2.4, hash_combine
    template <class... Args>
    constexpr std::size_t hash_combine(const Args&... args) noexcept(see below);
} // namespace jegp
```

#### 4.2.2 underlying

[utility.underlying]

```
template <class Enum>
constexpr std::underlying_type_t<Enum> underlying(Enum e) noexcept;
```

- <sup>1</sup> *Constraints:* `std::is_enum_v<Enum>` is true.
- <sup>2</sup> *Returns:* `static_cast<std::underlying_type_t<Enum>>(e)`.

#### 4.2.3 static\_downcast

[static.downcast]

- <sup>1</sup> A `static_cast` that performs a downcast.

```
template <class DerivedRef, class Base>
constexpr DerivedRef static_downcast(Base&& base) noexcept;

2 Let derived-ref be static_cast<DerivedRef>(std::forward<Base>(base)).
```

- <sup>3</sup> *Constraints:*

- (3.1) — `DerivedRef` is a reference type,
- (3.2) — `std::remove_cvref_t<DerivedRef>` is derived from `std::remove_cvref_t<Base>`, and
- (3.3) — *derived-ref* is well-formed.

- <sup>4</sup> *Preconditions:* *derived-ref* has well-defined behavior.

- <sup>5</sup> *Returns:* *derived-ref*.

## 4.2.4 hash\_combine

[hash.combine]

- <sup>1</sup> Inspired by Boost.ContainerHash. Useful in the specializations of `std::hash` whose Key's salient parts consist of two or more objects.

```
template <class... Args>
constexpr std::size_t hash_combine(const Args&... args) noexcept(see below);
```

<sup>2</sup> *Constraints:*

- (2.1) — `sizeof...(Args) ≥ 2` and
- (2.2) — `std::hash<T>` is enabled (C++ Standard's [unord.hash]) for all T in Args.

<sup>3</sup> *Effects:* Equivalent to:

```
std::size_t seed{0};
return (... , (seed ^= std::hash<Args>{}(args) + (seed << 6) + (seed >> 2)));
```

<sup>4</sup> *Remarks:* The expression inside `noexcept` is equivalent to

```
(noexcept(std::hash<Args>{}(args)) && ...)
```

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