

DILLIMAX 690 PE

High strength fine grained structural pressure vessel steel quenched and tempered

Specification DH-E69-C, edition December 2023¹

DILLIMAX 690 PE is a high strength quenched and tempered, fine grained steel for pressure equipment with a minimum yield strength of 690 MPa in its delivered condition (referring to the lowest thickness range). Its mechanical properties are achieved by water quenching followed by tempering.

DILLIMAX 690 PE is preferentially used for pressure parts. Its mechanical properties and analysis are in full compliance with the P690Q, P690QL1 or P690QL2 according to EN 10028-6.

Product description

Designation and range of application

DILLIMAX 690 PE plates can be delivered in thicknesses from 10 to 150 mm according to the dimensional program. Dimensions, which deviate from the usual dimensional program for this type of steel, may be possible on request.

Chemical composition

For the ladle analysis, the following max. values in % are applicable:

| C | Si | Mn | P | S | Cr | Ni | Mo | V+Nb | B | CEV typical |
|--------|--------|--------|---------|---------|--------|--------|--------|--------|---------|-------------|
| ≤ 0.20 | ≤ 0.80 | ≤ 1.70 | ≤ 0.020 | ≤ 0.005 | ≤ 1.50 | ≤ 2.50 | ≤ 0.70 | ≤ 0.18 | ≤ 0.005 | (*) |

$$CEV = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$$

(*) CEV 0.45 % for plate thickness 15 mm

CEV 0.58 % for plate thickness 50 mm

The steel is fine grained through sufficient aluminium content.

Delivery condition

Water quenched and tempered according to EN 10028-6.

¹ The current version of this material data sheet can be found on www.dillinger.de.

Mechanical properties

Tensile test at ambient temperature – transverse test specimens –

| Plate thickness [mm] | Minimum tensile strength R_m [MPa] | Minimum yield strength $R_{eH}^{a)}$ [MPa] | Minimum elongation A_5 [%] |
|----------------------|--------------------------------------|--|------------------------------|
| ≤ 65 | 795 – 930 | 690 | 14 |
| > 65 ≤ 100 | 770 – 940 | 670 | |
| > 100 ≤ 150 | 720 – 900 | 630 | |

^{a)} If not apparent, the yield strength $R_{p0.2}$ is measured instead.

Impact test on Charpy-V – transverse test specimens

| Option | Test temperature [°C] | Impact values A_v [J] |
|--------|-----------------------|-------------------------|
| 1*) | -20 | 40 |
| 2 | -40 | 27 |
| 3 | -60 | 27 |

^{*)} The lateral expansion of 0.38 mm is a minimum value for the average of 3 specimens.t

The test temperature is to be indicated on the order (option 1, 2 or 3). The specified impact values are minimum values for the average of 3 specimens. The lowest individual value is not to be less than 70 % of the specified minimum. For plate thicknesses below 12 mm, the test can be carried out on Charpy-V test pieces with reduced width; the minimum width must be 5 mm. The minimum impact value will be decreased proportionally.

Testing

Tensile and impact tests will be performed according to EN 10028-1.

The impact test will be carried out on Charpy-V-specimens in accordance with EN ISO 148-1.

Unless otherwise agreed, the test results are documented in a certificate 3.1 in accordance with EN 10204.

Identification

Unless otherwise agreed, the marking is carried out via low stress steel stamps with at least the following information:

- steel grade (DILLIMAX 690 PE)
- heat number
- rolled plate number and single plate number
- the manufacturer's symbol

Processing

The entire processing and application techniques are of fundamental importance to the reliability of products made from this steel. The fabricator should ensure that his calculation, design, and manufacturing methods are suitable for the intended application, are state-of-the-art and, that they correspond with the properties of the material. The customer is responsible for the selection of the material. The recommendations in accordance with EN 1011-2 (welding) und CEN/TR 10347 (forming) should be observed. The national rules regarding job safety are mandatory. DILLIMAX 690 PE has a similar processing behaviour as DILLIMAX 690, therefore please refer to the corresponding processing information for more details. Please note the exception for post weld heat treatment (PWHT). The critical value of 17.3 specified in EN 10028-6 applies to DILLIMAX 690 PE.

General technical delivery requirements

Unless otherwise agreed, the general technical delivery requirements in accordance with EN 10021 apply.

Tolerances

Unless otherwise agreed, the tolerances will be in accordance with EN 10029, with class B for thickness and table 4, steel group H, for the maximum flatness deviation. Smaller flatness deviations may be possible on request prior to order.

Surface quality

Unless otherwise agreed, the specifications will be in accordance with EN 10163-2, class B2.

General note

If requirements, which are not covered in this material data sheet, are to be met by the steel due to its intended use or processing, these requirements are to be agreed before placing the order.

The information in this material data sheet is a product description. This material data sheet is updated at irregular intervals. The current version is available from the mill or as download at www.dillinger.de.

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