

| | |
|------------------------|--|
| Quality | E335 (Fe 590 – Fe 60 – St 60-2 – C40E – C45E) |
| According to standards | EN 10025-2: 2004 |
| Number | 1.0060 |

Chemical composition

| C% | Si% | Mn% | P% max | S% max | N% max | Cu% |
|----|-----|-----|-----------|-----------|---------------------|-------------------------|
| | | | 0,045 | 0,045 | 0,012 ^{a)} | Cast analysis |
| | | | 0,055 | 0,055 | 0,014 ^{b)} | Product analysis |

FN deoxidation method - rimming steel not admitted

^{a)} N max value is not applied if chemical composition shows total Al content of 0.020%

^{b)} N the max value is not applied if chemical composition shows total Al content of 0.015%

Temperature °C

| Hot-forming | Supply state | Soft annealing | Isothermal annealing | Temperature values are valid for analysis close to: | | |
|--|--------------------------------|--|---------------------------------------|---|---------------------------------------|-----------|
| 1100-850 | natural | 690 air | 820 furnace cooling to 660 after, air | C% | Mn% | Si% |
| | | | | ~ 0.40 | ~ 0.60 | ~ 0.30 |
| In some cases, the piece can be normalized and tempered or quenched and tempered | | | | Pre-heating welding | Stress-relieving after welding | |
| Normalizing and tempering | Quenching and tempering | Stress-relieving | End quench hardenability | 250 | slow cooling | |
| 870 air | 840 water | 50° under the temperature of tempering | | Ac1 | Ac3 | Ms |
| 550-650 air | 550-650 air | | | 730 | 780 | 360 |

Mechanical properties

Hot-rolled EN 10025-2: 2004 **E335** 1.0060 (normalization is suggested)

Testing at room temperature

| size mm | | R | size mm | | ReH min | size mm | | A% L | A% T | HB |
|---------|-----|-------------------|---------|-----|-------------------|---------|-----|-------------------------|------|-----------------|
| from | to | N/mm ² | from | to | N/mm ² | from | to | min | min | for information |
| | 3 | 590-770 | | 16 | 335 | 3 | 40 | 16 | 14 | 176-231 |
| 3 | 100 | 570-710 | 16 | 40 | 325 | 40 | 63 | 15 | 13 | 169-218 |
| 100 | 150 | 550-710 | 40 | 63 | 315 | 63 | 100 | 14 | 12 | 159-218 |
| 150 | 250 | 540-710 | 63 | 80 | 305 | 100 | 150 | 12 | 11 | 158-218 |
| | | | 80 | 100 | 295 | 150 | 250 | 11 | 10 | |
| | | | 100 | 150 | 275 | over | to | Kv + 20 °C J min | | |
| | | | 150 | 200 | 265 | 10 | 150 | | | |
| | | | 200 | 250 | 255 | 150 | 250 | | | |

Cold-drawn +C EN 10277-2: 2008 **E335GC** 1.0543

Hot rolled – **Peeled Reeled +SH**

| size mm | | Testing at room temperature (longitudinal) | | | | Testing at room temperature (longitudinal) | | | |
|-----------------|-----|--|-----------------------|-----|-----------------|--|-----------------------|-----|---------|
| from | to | R ^{b)} | Rp 0.2 ^{b)} | A% | HB | R | Rp 0.2 | A% | HB |
| | | N/mm ² | N/mm ² min | min | for information | N/mm ² | N/mm ² min | min | |
| 5 ^{c)} | 10 | 700-1050 | 540 | 5 | 213-319 | | | | |
| 10 | 16 | 680-970 | 480 | 6 | 208-293 | | | | |
| 16 | 40 | 640-930 | 390 | 7 | 198-278 | 570-710 | | | 169-211 |
| 40 | 63 | 620-870 | 340 | 8 | 190-260 | 570-710 | | | 169-211 |
| 63 | 100 | 570-810 | 295 | 8 | 169-243 | 570-710 | | | 169-211 |

^{b)} for flats and special sections, yield point can be – 10% and tensile strength can be ± 10%

^{c)} for thickness < 5 mm, mechanical properties should be agreed before order placement

| EUROPE EN | ITALY UNI | CHINA GB | GERMANY DIN | FRANCE AFNOR | U.K. B.S. | RUSSIA GOST | USA AISI/SAE |
|-----------|-----------|----------|-------------|--------------|-----------|-------------|--------------|
| E335 | Fe 590 | HRB335 | St 60-2 | A 60-2 | | St6ps | |