



## SIQUAL 5415 Steel

### Designation by Standards

| Brand Name  | Ravne | Mat. No. | DIN     | EN    | AISI/SAE      |
|-------------|-------|----------|---------|-------|---------------|
| SIQUAL 5415 | 15MO3 | 1.5415   | 15Mo3 † | 16Mo3 | A182 Grade F1 |

### Chemical Composition (in weight %)

| C    | Si        | Mn   | Cr | Mo   | Ni | V | W | Others         |
|------|-----------|------|----|------|----|---|---|----------------|
| 0.16 | max. 0.40 | 0.60 | -  | 0.30 | -  | - | - | max. Cu = 0.30 |

### Description

Alloy special structural steels: steel with Mo, Nb, Ti, V or W.

### Applications

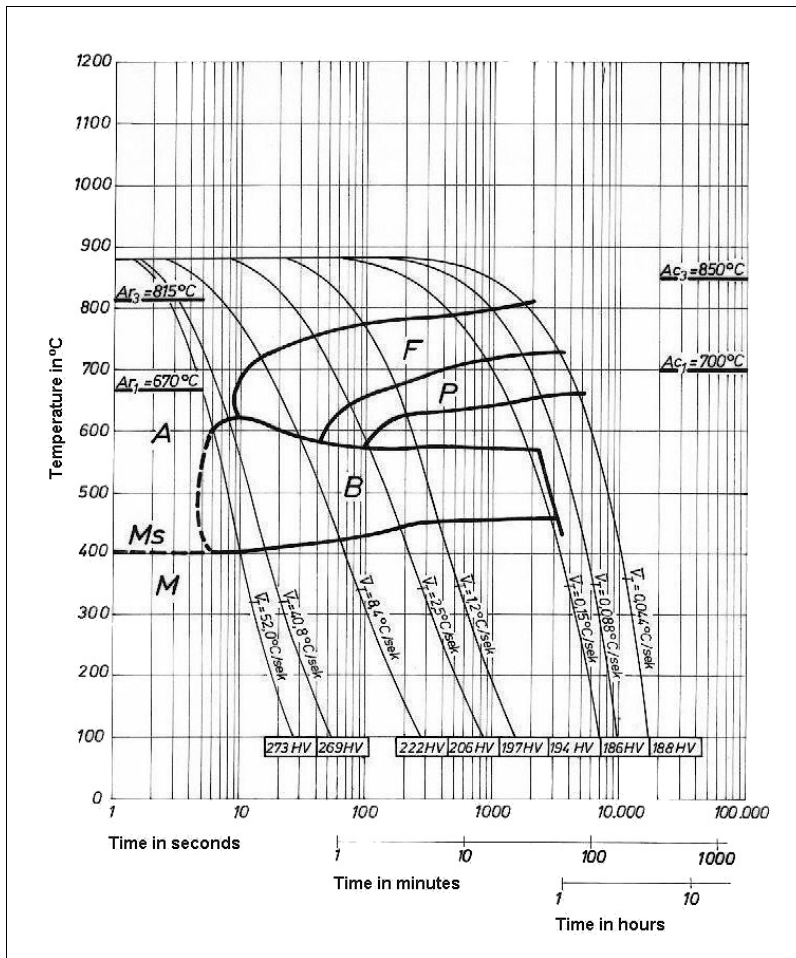
Welded steel tubes for pressure purposes. Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties.

### Physical properties (average values) at ambient temperature

Modulus of elasticity [ $10^3 \times \text{N/mm}^2$ ]: 210

Density [ $\text{g/cm}^3$ ]: 7.85

## Continuous Cooling Transformation (CCT) Diagram



### Soft Annealing

Heat to 660-700°C, cool slowly in furnace.

### Hardening

Harden from a temperature of 910-940°C followed by oil quenching.

### Tempering

Tempering temperature: 660-710°C.

### Mechanical Properties in Hardened and Tempered Condition

| Diameter in mm | 0.2 % proof stress (N/mm <sup>2</sup> ) | Tensile strength (N/mm <sup>2</sup> ) | Elongation (%) | Impact strength (J) |
|----------------|---|---------------------------------------|----------------|---------------------|
| up to 60       | 295                                     | 440-570                               | 23             | 50                  |
| 61-90          | 285                                     | 440-570                               | 23             | 50                  |
| 91-150         | 275                                     | 440-570                               | 23             | 50                  |

**0.2 % Proof Stress (N/mm<sup>2</sup>) vs. Temperature**

| 100°C | 150°C | 200°C | 250°C | 300°C | 350°C | 400°C | 450°C | 500°C |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 264   | 245   | 225   | 205   | 180   | 170   | 160   | 155   | 150   |
| 250   | 230   | 210   | 195   | 170   | 160   | 150   | 145   | 140   |
| 240   | 220   | 200   | 185   | 160   | 155   | 145   | 140   | 135   |

**1 % Creep Limit (N/mm<sup>2</sup>) vs. Temperature (°C)**

| Hours   | 450°C | 460°C | 480°C | 500°C | 520°C | 540°C | 560°C |
|---------|-------|-------|-------|-------|-------|-------|-------|
| 10 000  | 298   | 273   | 222   | 171   | 125   | -     | -     |
| 100 000 | 245   | 209   | 143   | 93    | 59    | -     | -     |
| 200 000 | 228   | 189   | 121   | 75    | 45    | -     | -     |

**Creep Rapture Strength (N/mm<sup>2</sup>) vs. Temperature (°C)**

| Hours   | 450°C | 460°C | 480°C | 500°C | 520°C | 540°C | 560°C |
|---------|-------|-------|-------|-------|-------|-------|-------|
| 10 000  | 370   | 348   | 304   | 239   | 179   | 129   | 91    |
| 100 000 | 285   | 251   | 190   | 137   | 94    | 61    | 40    |
| 200 000 | 260   | 226   | 167   | 115   | 76    | 50    | 32    |

**Forging**

Hot forming temperature: 1100-850°C.

**Machinability**

No data.

Forms manufactured: Please see the [Dimensional Sales Program](#).

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