



| Technical Data Sheet | Grade  | Code (SEL)      | Resin mould steel |
|----------------------|--------|-----------------|-------------------|
|                      | 1.2738 | 40CrMnNiMo8-6-4 |                   |

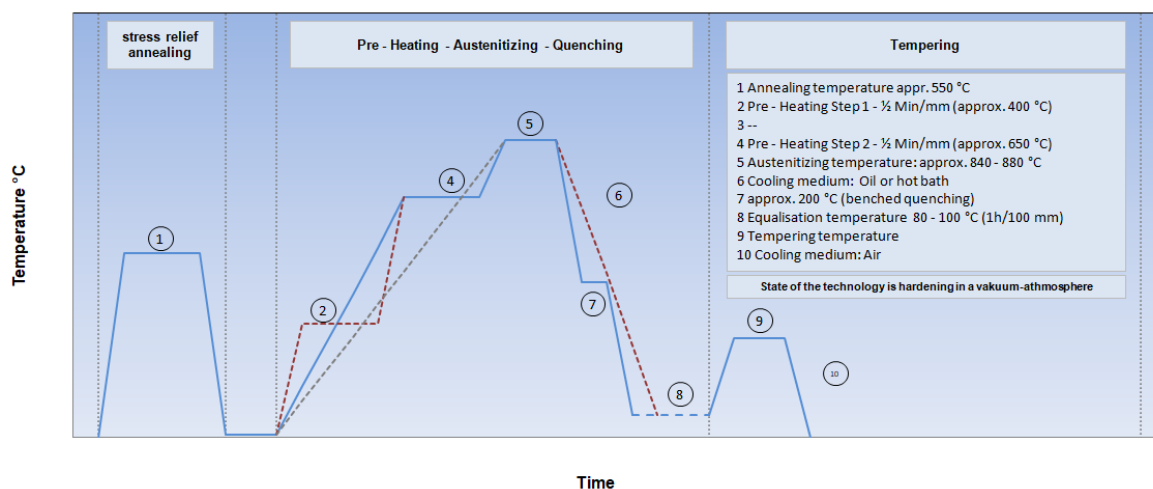
| Standards                          | Steel properties                                                                                                                                                                                                                                          |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EN ISO 4957</b> 40CrMnNiMo8-6-4 | Pre-hardened plastic mould steel with Ni (appr. 1%) for a netter through-hardenableity (also for dimensions bigger 400 mm). Good machinability and outstanding polishability, suitable for texturing, improved through hardening in comparison to 1.2311. |
| <b>AFNOR</b> 40CMND8               |                                                                                                                                                                                                                                                           |
| <b>BS</b> -                        |                                                                                                                                                                                                                                                           |
| <b>UNE</b> -                       |                                                                                                                                                                                                                                                           |
| <b>UNI</b> -                       |                                                                                                                                                                                                                                                           |
| <b>AISI</b> P 20+Ni                | <b>Suitable for:</b><br><br>Large plastic moulds with deep engravings and intensive impacts on the core. Hydroforming, dies                                                                                                                               |
| <b>GOST</b> 4X2ГНМ                 |                                                                                                                                                                                                                                                           |

| C    | Si   | Mn   | Cr   | Mo   | Ni   | V | W | Co | Sonst. |
|------|------|------|------|------|------|---|---|----|--------|
| 0,40 | 0,30 | 1,50 | 1,90 | 0,20 | 1,00 | - | - | -  | -      |

|                                 |                   |                                                                                                                                                                                                                                                                                          |
|---------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Melting</b>                  | EAF + VOD         | <b>Remarks</b><br><br>In the DIN EN ISO 4957 the grades 1.2311, 1.2312 and 1.2738 have been summarised. 1.2738 contains additional quantities of Ni (for a better through hardenableity) and no additional quantities of S.<br><br>Preheating before use: 250 - 300 °C – is recommended. |
| <b>Density (g/cm³)</b>          | 7,80              |                                                                                                                                                                                                                                                                                          |
| <b>Supply condition</b>         | quenched+tempered |                                                                                                                                                                                                                                                                                          |
| <b>Hardness (HB)</b>            | 290 - 325         |                                                                                                                                                                                                                                                                                          |
| <b>Tensile strength (N/mm²)</b> | -                 |                                                                                                                                                                                                                                                                                          |
| <b>Work hardness (HRC)</b>      | -                 |                                                                                                                                                                                                                                                                                          |
| <b>Structure</b>                | -                 |                                                                                                                                                                                                                                                                                          |
| <b>Cleanness (DIN 50602)</b>    | -                 |                                                                                                                                                                                                                                                                                          |

| Physical properties                     |                                      | 20 °C | 100 °C | 200 °C | 300 °C | 350 °C | 400 °C | 500 °C | 600 °C | 700 °C |
|-----------------------------------------|--------------------------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>Thermal expansion coefficient</b>    | 10 <sup>-6</sup> * K (20 °C bis ...) | -     | 11,1   | 12,9   | 13,4   | -      | 13,8   | 14,2   | 14,6   | 14,9   |
| <b>Thermal conductivity (w / m * K)</b> | annealed                             | 34,5  |        |        |        | 33,5   |        |        |        | 32,0   |
|                                         | quenched + tempered                  | -     |        |        |        | -      |        |        |        | -      |

#### Thermal Cycle Diagram (Heat treatment)



Hinweis: Die in diesem Datenblatt enthaltenen Angaben dienen der Beschreibung, eine Haftung ist ausgeschlossen.



| Heat treatment                 | Temperature (°C) | Cooling  | Remarks heat treatment                                                                                          |
|--------------------------------|------------------|----------|-----------------------------------------------------------------------------------------------------------------|
| <b>Soft annealing</b>          | 710 - 740        | Furnace  | Controlled slow cooling in furnace                                                                              |
| <b>Stress-relief annealing</b> | 500 - 550        | Furnace  | The recommended temperature of 500 - 550 °C is valid for the quenched and tempered condition.                   |
| <b>Hardening</b>               | 840 - 880        |          | After through-heating hold for 15-30 minutes                                                                    |
| Pre – heating Step 1           | appr. 400        |          | Enhanced stress corrosion cracking susceptibility in case of a oil or polymer hardening                         |
| Pre – heating Step 2           | appr. 650        |          |                                                                                                                 |
| Pre – heating Step 3           | -                |          |                                                                                                                 |
| <b>Quenching</b>               | appr. 200        | hot bath | 840 - 860 °C (Oil) and 860 - 880 °C (Air). In case of oil or polymer hardening interrupt at appr. 300 - 400 °C. |
|                                | appr. 80         | Oil      |                                                                                                                 |
|                                | -                | -        |                                                                                                                 |
|                                | -                | -        |                                                                                                                 |

| Tempering Chart                                                                                                                                                                       | Tempering – Hardness after tempering |     |     |     |     |     |     |     |     |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                                                                                                                                                                       | Temperature °C                       | 100 | 200 | 300 | 400 | 500 | 550 | 600 | 650 | 700 |
|                                                                                                                                                                                       | HRC                                  | 51  | 50  | 48  | 46  | 42  | -   | 39  | -   | 28  |
| <b>Remarks for tempering</b><br>Slow heating to tempering temperature immediately after hardening. Time in furnace 1 hour for each 20 mm of workpiece thickness but at least 2 hours. |                                      |     |     |     |     |     |     |     |     |     |

| Continuous Cooling Transformation Chart | Heat resistance chart |
|-----------------------------------------|-----------------------|
|                                         |                       |