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## TO: WHOM IT MAY CONCERN

### TEMPERATURE PRESSURE RELATIONSHIP FOR uPVC PIPES

The **pressure-temperature relationship for uPVC pipes** is important to understand, since uPVC is a thermoplastic material, the pressure rating of uPVC pipes decreases with increasing temperature.

The pressure rating for uPVC pipes is usually based on a reference temperature of **20°C (68°F)**. For example, common pressure ratings at 20°C include:

- **PN6** (6 bar or 87 psi) , **PN10** (10 bar or 145 psi), **PN16** (16 bar or 232 psi)

As the temperature increases above 20°C (68°F), the pressure ratings of the uPVC pipe decrease. A derating factor (as given in below table) is applied to the original pressure rating depending on the working temperature (with a fluctuation not exceeding 5 °C).

#### Typical Derating Factors for uPVC Pipes:

| Temperature (°C) | Derating Factor (Multiplier) | Max Allowable Pressure (%) |
|------------------|------------------------------|----------------------------|
| 20°C (68°F)      | 1.00                         | 100%                       |
| 30°C (86°F)      | 0.90                         | 90%                        |
| 35°C (95°F)      | 0.80                         | 80%                        |
| 40°C (104°F)     | 0.70                         | 70%                        |
| 45°C (113°F)     | 0.60                         | 60%                        |
| 50°C (122°F)     | 0.45                         | 45%                        |
| 55°C (131°F)     | 0.30                         | 30%                        |
| 60°C (140°F)     | 0.15                         | 15%                        |

For Example:

If a uPVC pipe is rated for **PN10 (10 bar)** at 20°C:

- At **40°C**, the derating factor is 0.70.  
New pressure rating = **10 bar × 0.70**  
= **7.0 bar**.

- At **50°C**, the derating factor is 0.45.  
New pressure rating = **10 bar × 0.45**  
= **4.5 bar**.

uPVC pipes are rated for temperatures up to **60°C (140°F)**, Ensure that the maximum operating temperature of the PVC pipe does not exceed its rated limit.

As with all pipelines special precautions must be taken when there is a possibility of water hammer or surge pressure. Incorporating surge tanks or pressure release valves in the system will obviate this problem. Ambient or fluid temperature, and external heat sources can all affect the pressure capacity of uPVC pipes.

*By considering both the temperature and the pressure rating of the pipe, you can select the appropriate uPVC piping system for your specific application.*

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