

ASTM A182 F22 material specification

Category	Details																																																			
Material Data Sheet	ASTM A182 F22 material specification																																																			
Type of Material	2¼ Cr 1 Mo alloy steel																																																			
Material Description	ASTM A182 F22 is a low-alloy steel grade commonly used for high-temperature and high-pressure applications. It belongs to the 2¼Cr-1Mo (2.25% Chromium, 1% Molybdenum) alloy steel family. The standard covers forged or rolled alloy steel flanges, fittings, valves, and high-temperature parts.																																																			
Chemical composition	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Grade/Identification Symbol</th> <th rowspan="2">UNS Designation</th> <th colspan="10">Composition, %</th> </tr> <tr> <th>Carbon</th> <th>Manganese</th> <th>Phosphorus</th> <th>Sulfur</th> <th>Silicon</th> <th>Nickel</th> <th>Chromium</th> <th>Molybdenum</th> <th>Niobium</th> <th>Titanium</th> <th>Other</th> </tr> </thead> <tbody> <tr> <td>F 22</td> <td rowspan="3">K21590</td> <td rowspan="3">0.05 – 0.15</td> <td rowspan="3">0.30 – 0.60</td> <td rowspan="3">0.04</td> <td rowspan="3">0.04</td> <td rowspan="3">0.5</td> <td rowspan="3">...</td> <td rowspan="3">2.00 – 2.50</td> <td rowspan="3">0.87 – 1.13</td> <td rowspan="3">...</td> <td rowspan="3">...</td> <td rowspan="3">...</td> </tr> <tr> <td>Class 1</td> </tr> <tr> <td>F 22</td> </tr> <tr> <td>Class 3</td> <td>K21590</td> <td>0.05 – 0.15</td> <td>0.30 – 0.60</td> <td>0.04</td> <td>0.04</td> <td>0.5</td> <td>...</td> <td>2.00 – 2.50</td> <td>0.87 – 1.13</td> <td>...</td> <td>...</td> <td>...</td> </tr> </tbody> </table>	Grade/Identification Symbol	UNS Designation	Composition, %										Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Niobium	Titanium	Other	F 22	K21590	0.05 – 0.15	0.30 – 0.60	0.04	0.04	0.5	...	2.00 – 2.50	0.87 – 1.13	Class 1	F 22	Class 3	K21590	0.05 – 0.15	0.30 – 0.60	0.04	0.04	0.5	...	2.00 – 2.50	0.87 – 1.13
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Mechanical Properties	Tensile Strength: 415 MPa min Yield Strength (0.2%): 205 MPa min Elongation: 20% min Hardness: Max 197 HBW																																																			
Heat treatment	Tempering temperature shall be minimum 725 ° C (1 337 ° F). During the heat treatment process, forgings shall be placed in such a way as to ensure free circulation around each fitting including any quenching operation.																																																			
Non-destructive testing	ASTM A961 supplementary requirement S55 shall apply. Acceptance criteria shall be according to ASME BPVC, Sec. VIII, Div. 1, Appendix 6. Examination shall be performed after final heat treatment and final machining.																																																			
Repair of defects	Weld repair is not permitted.																																																			
Sour service (additional requirements) ^a	When sour service requirements are specified by the purchaser, the material shall conform to the requirements of ISO 15156/NACE MR0175 or ISO 17945/NACE MR0103, and the additional requirements of this MDS. Chemical composition: S ≤ 0.025 % The material shall be traceable in accordance with ISO 15156-2/NACE MR0175-2, section 9 and this MDS.																																																			
Product type	Forged A182 F22 Flanges (ASME B16.5 / B16.47) Weld Neck Flange Blind Flange Slip On Flange Socket Weld Flange Threaded Flange Long Weld Neck Flange 2. Forged Fittings (ASME B16.11) Socket Weld Elbow Socket Weld Tee / Cross Socket Weld Coupling / Half Coupling Threaded Elbow / Tee / Union / Plug / Cap																																																			
Marking	The forgings shall be marked to ensure full traceability to heat and heat treatment lot.																																																			
Certification	The material manufacturer shall have a quality system certified in accordance with ISO 9001 or another quality requirements standard accepted by the purchaser. The inspection documents shall be in accordance with ISO 10474 /EN 10204 Type 3.1 and shall confirm compliance with this specification. The inspection documents shall include the following information: - Heat treatment conditions including tempering temperature and holding time.																																																			