

For Carbon Steel Material:

- ✓ As a minimum only plate material with certificate of compliance with the order (type 3.1 acc. to EN 10204) shall be used.
- ✓ Materials for pipe supports and their components shall at least be suitable for minimum temperature of -44°C. Carbon steel material which is directly welded to pipe or in direct contact with pipe shall be suitable for the lowest design temperature of -52°C.
- ✓ For Impact Testing Requirement of Individual Items,
 - a) Impact test with load of 27 J/cm² at a temperature -52°C shall be performed.
 - Material shall be suitable for the lowest design temperature -52°C.
 - An impact test with load of 27 J/cm² at a temperature -52°C shall be performed.
 - Stock Material shall not be older than year 2020 (MTC Date)

For Alloy Steel Material:

- a) Impact test with load of 27 J/cm² at a temperature -20°C is required for 1.25 Cr-0.5 Mo and 2.25 Cr-1Mo material.
- b) Impact test with load 35 J/cm² at a temperature +20°C is required for 9Cr-V material.

Table 1: Material groups

Material Group	Part	Material limits of temp., °C	Material			
			Type	Designation	ASTM	
11	-	This material group is generally not applicable for the project due to low ambient temperature. Nevertheless, it shall be kept due to IT reasons (there are pipe support elements, like guiding elements, minor steel structure elements etc., given in MARIAN for the material group 11 only. For selection of material for this group please refer to the group 12				
12 ¹⁾	Profile	-44 to +300	Low temp. carbon steel	-	S355NL	
	Flat steel ²⁾	-52 to +427			-	A516 Gr.60N ^{1),4)} A516 Gr.70N ^{3),4)}
	Plate					
	Clamp ⁷⁾					
	U-strap					
	Pipe	-52 to +427			A 333 Gr. 6 ¹⁾	
	Bolts	-73 to +427	-	-	ASTM A320 GR. L7M	
	U-bolts				ASTM A194 GR.7ML	
	Nuts	-101 to +593				
	Insulation parts	-196 to +160	Non-metallic	Fibre-reinforced polyester resin (FRP)	-	
		-196 to +120	Non-metallic	Polyurethane (PUR) foam	-	
	Sliding plates	-196 to +200	Non-metallic	PTFE / Polytetrafluorethylene	-	
continued						

continued

Table 1: Material groups

Material Group	Part	Material limits of temp., °C	Material			
			Type	Designation	ASTM	
continued						
13	Profile	-198 to +816	Stainless steel	-	A 276 Gr. 304L, 321 or Gr. 304 for thicknesses up to 6 mm	
	Plate				A 240 Gr. 304L, 321 or Gr. 304 for thicknesses up to 6 mm	
	Flat steel ²⁾					
	Clamp ⁷⁾					
	U-strap				A 312 Gr. 304L, 321 or Gr. 304 for thicknesses up to 6 mm	
	Pipe	-254 to +816		-		
	Bolts ⁸⁾	-254 to +565			-	ASTM A193 GR.B8 CL.2
	U-bolt					
	Nuts ⁹⁾					
	Insulation parts	-198 to +180		Non-metallic		
-198 to +129		Non-metallic	Polyurethane (PUR) foam	-		
Sliding plates	-198 to +200	Non-metallic	PTFE / Polytetrafluorethylene	-		
14 ¹⁾	Plate	-29 to +649	Alloy steel	-	A 387 Gr. 12 Cl. 2 ^{1) 6)}	
	Flat steel ²⁾					
	Clamp					
	Bolts	-29 to +593			ASTM A193 GR.B18	
	Nuts	-101 to +593			ASTM A194 GR.7L	
	Sliding plate	-200 to +400	Brass alloy	Bronze / Graphite Pad	-	
15	-	This material group is not applicable for the project due to low ambient temperature.				

¹⁾ Additional requirements for materials in low temperature environment see technical purchase specification, clause 3.2

²⁾ Alternatively, plates can be used

~~* in creep range up to +550°C as per DIN EN 10280~~

⁴⁾ "N" – normalized as per ASME B31.3 Fig. 323.2.2A Note (3) – shall be applicable up to -52°C

~~* by using at higher temperature (up to +550°C) material shall be replaced with X5CrNi18-10 as per DIN EN 10280~~

6) R.Pad / Shear lug directly welded to P91 material pipes shall be of plate A 387 Gr. 22 Cl. 2. Remaining items of support welded to R-Pad or shear lug can be of A 387 Gr. 12 Cl. 2

7) For Alloy 800 pipe material (Pipe class NP0F26), use carbon steel (AZ12) clamped support upto 427°C with 1 mm SS plate strip between pipe & clamp. For temperature 428°C and above use stainless steel (AZ13) clamped support.

Table 2: List of materials for parts independent from piping design temperature (mostly designed for ambient temperature)

Material type	Part	Material limits of temperature, °C	Material
			ASTM
Carbon Steel ¹⁾	Profile	-44 to +300	S355NL
	Plate	-52 to +427	A 516 Gr. 60 or Gr. 70 ¹⁾
	Clamp		
	U-strap		A 333 Gr. 6
	Pipe	-73 to +427	ASTM A320 GR. L7M
	Bolts		
	U-bolts		
	Thread rods	-101 to +593	ASTM A194 GR.7ML
	Nuts		Stainless steel
	Washer	-	
	Shear connector	-52 to +427	A 333 Gr. 6
Stainless Steel	Profile	-200 to +816	A 276 Gr. 304L, 321 or Gr. 304 for thicknesses up to 6mm
	U-Bolt		A 240 Gr. 304L, 321 or Gr. 304 for thicknesses up to 6mm
	Plate		
	Clamp		A 312 Gr. 304L, 321 or Gr. 304 for thicknesses up to 6mm
	U-strap		
	Pipe	-196 to +593	ASTM A193 GR.B8 CL.2
	Bolts		
	U-bolts		
	Thread rods		
	Nuts		ASTM A194 GR.8A
	Washer	-	Stainless steel
¹⁾ Additional requirements for materials in low temperature environment see technical purchase specification AGCC.323-2000-50S-0041 (L-SP 3003) for pipe supports, clause 3.2			