

Materials and Applications Suitability Matrix

Oil & Gas Production & Transmission

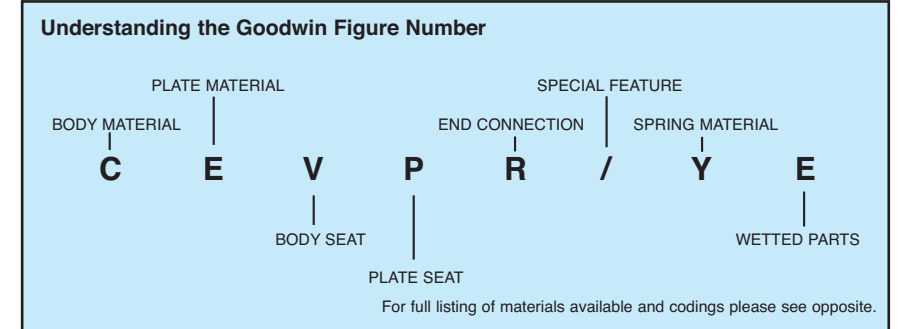
Figure Number Body Material API 600 Trim Number Temperature Range - Deg C Temperature Range - Deg F	CARBON STEEL					LOW TEMP CARBON STEEL			STAINLESS STEEL			NON-FERROUS		DUPLEX		NICKEL ALLOYS			TITANIUM		
	CEPPR-YE	CEEPR-YE	CEVPR-YE	CEUPR-YE	CEUUR-YE	OSSPR-YS	OSVPR-YS	OSUUR-YS	SSPPR-YS	SSVPR-YS	SSUUR-YS	YPPR-YS	AAPPR-YI	AANPR-YI	QOPPR-YI	QOUUR-YI	ZZPPR-YI	IIPPR-YI	IUIUR-YI	OIIPR-YI	TTPPR-TT
	WCB	WCB	WCB	WCB	WCB	LCC	LCC	LCC	CF8M	CF8M	CF8M	CF8C	AB2	AB2	S31803	S31803	S32760	INCONEL 625	INCONEL 625	LCC/625 CLAD	TITANIUM
Crude Oil - Sweet Non-Abrasive	2	1	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Oil - Sweet & Abrasive	4	3	3	2	1	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4
Crude Oil - Sour Non-Abrasive	2	1	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Oil - Sour & Abrasive	4	4	4	3	2	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4
Gas, Hydrocarbon - Sweet Non-Abrasive	2	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas, Hydrocarbon - Sweet & Abrasive	4	3	3	2	1	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4
Gas, Hydrocarbon - Sour Non-Abrasive	2	1	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas, Hydrocarbon - Sour & Abrasive	4	4	4	3	2	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4
Hydrocarbon Liquids - Sweet Non Abrasive	2	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocarbon Liquids - Sweet & Abrasive	4	3	3	2	1	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4
Hydrocarbon Liquids - Sour Non Abrasive	2	1	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocarbon Liquids - Sour & Abrasive	4	4	4	3	2	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4
Compressed Air	2	2	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel - Diesel	2	2	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel - Gas	2	2	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Instrument Air	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Lube Oil	2	1	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen (or other inert gas)	2	2	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seawater Fire Service	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Seawater Injection	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Water (Effluent) - Foul	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Water (Potable)	4	4	4	4	4	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Injection (Sour)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Refining, Transmission & Petrochemical

Figure Number Body Material API 600 Trim Number Temperature Range - Deg C Temperature Range - Deg F	CARBON STEEL					LOW TEMP CARBON STEEL			CHROME STEEL			STAINLESS STEEL			NON-FERROUS		NICKEL ALLOYS			
	CEPPR-YE	CEEPR-YE	CEVPR-YE	CEUPR-YE	CEUUR-YE	OSSPR-YS	OSVPR-YS	OSUUR-YS	DEPPR-YE	PEPPR-TE	WEPPR-YE	SSPPR-YS	SSVPR-YS	SSUUR-YS	AAPPR-YI	AANPR-YI	IIPPR-YI	IUIUR-YI	OIIPR-YI	
	WCB	WCB	WCB	WCB	WCB	LCC	LCC	LCC	WC6	C5	C12	CF8M	CF8M	CF8M	AB2	AB2	INCONEL 625	INCONEL 625	LCC-625 CLAD	
Crude Oil - Sweet Non-Abrasive	2	1	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0
Crude Oil - Sweet & Abrasive	4	3	3	2	1	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4
Crude Oil - Sour Non-Abrasive	2	1	1	0	0	2	2	0	2	2	2	0	0	0	0	0	0	0	0	0
Crude Oil - Sour & Abrasive	4	4	4	3	2	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4
Hydrocarbon Liquids - Sweet Non Abrasive	2	1	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0
Hydrocarbon Liquids - Sweet & Abrasive	4	3	3	2	1	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4
Hydrocarbon Liquids - Sour Non Abrasive	2	1	1	0	0	2	2	0	2	2	2	0	0	0	0	0	0	0	0	0
Hydrocarbon Liquids - Sour & Abrasive	4	4	4	3	2	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4
Instrument Air	3	3	3	3	3	3	3	3	0	0	0	2	1	0	0	0	0	0	0	0
Water Potable	4	4	4	4	4	3	3	3	4	4	4	1	1	0	0	0	0	0	0	0

Gas Liquefaction & LNG

Figure Number Body Material API 600 Trim Number Temperature Range - Deg C Temperature Range - Deg F	LOW TEMP CARBON STEEL				STAINLESS STEEL			NON-FERROUS		DUPLEX		NICKEL ALLOYS		
	OSSPR-YS	OSUUR-YS	77PPR-YS	22PPR-YS	SSPPR-YS	YPPR-YS	AAPPR-YI	MMPPR-MM	QOPPR-YI	ZZPPR-YI	IIPPR-YI	OIIPR-YI		
	LCC	LCC	LC1	LC3	CF8M	CF8C	AB2	MONEL	S31803	S32760	INCONEL 625	LCC/625 CLAD		
Liquid Argon	5	5	5	5	1	0	1	1	5	5	0	5		
Liquid Hydrogen	5	5	5	5	1	0	1	1	5	5	0	5		
Liquid Nitrogen	5	5	5	5	1	0	1	1	5	5	0	5		
Liquid Oxygen	5	5	5	5	1	0	1	1	5	5	0	5		
LNG at -161 Deg C	5	5	5	5	1	0	1	1	5	5	0	5		
Butane	1	1	0	0	0	0	0	0	0	0	0	0		
LPG	1	1	0	0	0	0	0	0	0	0	0	0		
Propane	1	1	0	0	0	0	0	0	0	0	0	0		



Desalination & Water Transmission

Figure Number Body Material API 600 Trim Number Temperature Range - Deg C Temperature Range - Deg F	CARBON STEEL		STAINLESS STEEL				CAST IRON		DUCTILE IRON		NI-RESIST		NON-FERROUS					
	CAXPR-SS	CAXPR-II	SSPPR-SS	SSPPR-II	SSVPR-SS	SSVPR-II	XAXPF-MM	XAXPF-II	9ANPF-MM	9ANPF-II	88PPR-SS	88PPR-II	88NPR-SS	88NPR-II	AAPPR-MM	AAPPR-II	AANPR-MM	AANPR-II
	WCB / LINED	WCB / LINED	CF8M	CF8M	CF8M	CF8M	C IRON LINED	C IRON LINED	DUCTILE IRON	DUCTILE IRON	A439 D2	A439 D2	A439 D2	A439 D2	AB2	AB2	AB2	AB2
Brine (De Oxygenated)	2	1	0	0	1	0	2	2	0	0	1	0	1	0	1	0	1	0
Brine (Oxygenated)	4	2	4	4	4	4	3	2	3	2	4	1	4	1	1	1	1	1
Distillate	1	0	1	0	1	0	1	0	1	0	0	0	0	1	0	1	0	0
Seawater, Flowing	2	0	2	0	2	0	2	0	2	0	1	0	1	0	1	0	1	0
Seawater, Stagnant	4	2	4	4	4	4	3	2	3	2	4	1	4	1	1	1	1	1
Water, Demineralised / Potable	2	0	1	0	1	0	2	2	2	2	2	0	2	0	1	0	1	0

Notes:-

- The information in the above chart is intended as a general guide based on previous supply history over the last 25 years to the hydrocarbon, energy and process industries. Ultimate responsibility for material selection rests with the customer.
- Goodwin Check Valves are manufactured to meet requirements of NACE MR 01 75 when specified in customer enquiry/order.
- For sour service applications, Inconel 718 springs can be provided when specified in customer enquiry/order.
- For stagnant seawater and oxygenated brine applications, Inconel 625* springs should be used.
- If tight shut-off is a requirement, soft seats such as Viton® or Buna N® are available, subject to compatibility with fluid and temperatures.
- All Goodwin Check Valves are supplied as Retainerless* construction ensuring the pressure boundary is not degraded by crevice corrosion in sour service applications as compared to the old fashioned retainer design that is prone to crevice corrosion down the retainer sealing threads in the valve body.
- Goodwin Check Valves are certifiable in compliance with the European Pressure Equipment Directive (PED) 97/23/EC when specified in customer enquiry/order.
- Goodwin does not recommend use of Dual Plate Check Valves in reciprocating machinery applications. It is the responsibility of the customer to ensure the valve is suitable for its intended application.

* Lined valves are fitted with retainers but these are protected from the line fluid by resilient sealing compound.

Legend:-

OVERSPECIFIED - 0
EXCELLENT - 1
GOOD - 2
SATISFACTORY - 3
NOT RECOMMENDED - 4 *
DO NOT USE - 5 †

* Not Recommended - The use of this construction on the particular application is likely to lead to premature failure of the valve, which may lead to catastrophic failure or fatality.

† Do Not Use - You must avoid using this construction on the particular application to avoid catastrophic failure and possible fatality.