



Steel, Stainless Steel, High & Super Alloy-
Heat, Wear, Abrasion, Pressure & Corrosion Resistant
Castings, Spares, Replacement Parts, Custom-Made Components
Manufacturer-Supplier to OEM's, Plants, & Process Industry
Machined, Proof-Machined, CNC/VMC Precision Machined Components
Conversion to Castings from Fabrications, Forgings & Welded Assemblies
Engineering, Materials & Metallurgical Consulting

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ACME® India Mark -II Stainless Steel Deep Well Hand Pump (DWHP)

Desideratum of public domain deep well hand pump (DWHP)-proven design, inter-changeability of components, longer life, reliable performance, and demanding minimum possible maintenance lead to development of India Mark II deep well hand pump in 1979 in response to severe drought India faced in 1977. Today, it is one of the most popular and widely used deep well hand pump in the world with over 7 million installations world wide.

India Mark-II hand pumps were manufactured to IS:9301 specification is the culmination of combined research and development initiative of UNICEF India, Bureau of Indian Standards (BIS), government agencies and elite manufacturers. The handpump specifications ever since its development have undergone several revisions and amendments to suit local conditions in India, less developed nations (LDS), and developing nations grappling with clean drinking water issues across the world. The pump cylinder components are manufactured in brass/gun metal alloy and then assembled into a cast-iron cylinder body, which is fitted with brass liner on the inside. The pump has mild steel galvanized plunger and connecting rods with some nitrile (Butadiene acrylonitrile or Buta N) rubber parts.

Keeping in perspective conventional advantages of stainless steels, and being a 100% recyclable material, ACMECAST pioneered design, development and manufacturing of corrosion resistant stainless steel deep well hand pump cylinder, cylinder components, connecting rod and riser main systems. ACMECAST is a manufacturer-supplier-exporter to all OEMs in India engaged in manufacturing of India Mark Deep Well Hand Pumps in stainless steel configuration grades SS 304, and SS 316.

Our pump parts are made in better corrosion resistant alloy material that what is specified in the Indian Standard Specification IS:9301-martensitic stainless steel grade SS 410. The cylinder, connecting rods, plunger rods and other assemblies are made from stainless steel conforming to AISI 304/ 316 while the cast cylinder components are manufacturer to ACI-ASTM A 743/ A 743 CF-8 (SS 304), CF-8M (SS 316) USA stainless steel casting standard specification which is equivalent to wrought alloy type AISI 304 and AISI 316. The cast components can be further offered in ACME Proprietary Modified alloys by stabilizing it with titanium and niobium/columbium that enhances corrosion resistance and welding ability. Use of stainless steel pump cylinder with inner diameter super finished to high degree of smoothness eliminates the use of brass liners used in conjunction with the cast iron cylinder body. Argon/electrode arc welding protocols confirm to weld procedures and welding standards of ASTM/ AWS. The parts are finally cleaned and provided with good buffed surface finish.

Lately, with the proliferation of proliferation of poison plastic PVC being of low cost compared to stainless steel and mild steel has been replaced by more amenable recyclable uPVC. To meet the budget requirements of projects that cannot afford complete stainless steel solution, are replaced by uPVC riser main systems while keeping pump cylinder unit, plunger rod and connecting rod system in stainless steel SS 304/ SS316. Furthermore, many hand pump NGO's and Government Water Projects also at time use SS 410 connecting rod and plunger rods instead of SS 304/ SS316.

ACMECAST is committed to providing stainless steel solutions to deep well hand pump used for community service and providing clean drinking water to people across the world.

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Cylinder Assembly Components

Part Number	Number	Description	Material as specified in the IS: 9301 standard specification for deep well hand pump India Mark II	AcmeCast™ & Acme Alloys™ Material specification
1	One (1)	Plunger rod	Gr 04 Cr 10 Ni 10	SS 304 / SS 316
2	Two (2)	Reducer cap (Upper & Lower)	Grade FG 200	SS 304 / SS 316
3	Three (3)	Sealing ring	Nitrile rubber	Nitrile rubber
4	One (1)	Plunger yoke body	Gr LTB 2	SS 304 / SS 316
5	Two (2)	Hex coupler M12 x 1.75	Gr 04 Cr 18 Ni 10	SS 304 / SS 316
6	One (1)	Rubber seating (upper valve)	Nitrile rubber	Nitrile rubber
7	One (1)	Upper valve	Gr LTB 2	SS 304 / SS316
8	Two (2)	Pump buckets	Nitrile rubber	Nitrile rubber
9	One (1)	Spacer	Gr LTB 2	SS 304 / SS 316
10	One (1)	Follower	Gr LTB 2	SS 304 / SS 316
11	One (1)	Cylinder body	Grade FG 200	SS 304/ SS316
12	One (1)	Brass Liner	Cu Zn 30	Not Required
13	One (1)	Rubber seat retainer	Gr LTB 2	SS 304 / SS316
14	One (1)	Rubber seating of lower valve	Nitrile rubber	Nitrile rubber
15	One (1)	Check valve	Gr LTB 2	SS 304 / SS316
16	One (1)	Check valve seat	Gr LTB 2	SS 304 / SS316

Material

The pump components are manufactured in corrosion resistant stainless steel (18/8) of type SS304 and SS316. The wrought alloy chemical compositions are slightly different from the cast alloy counterparts in ASTM, ANSI, AISI, SAE, BS, ANFOR, EURO NORM and other country standards. (Reference: Annexure A. It is available in PDF format and can be downloaded from the technical literature page of our website.) The cast components are made to the Alloy Casting Institute (ACI) – American Society of Testing Materials (ASTM) standard ASTM 743 A/ 743 M. Other parts like cylinder pipes, connecting rods, plunger rods, hex couplers, bolts etc., are made in stainless steel from bright bar stock or formed products confirming to American Iron and Steel Institute (AISI) standards type 304 and 316.

Standard: ACI- ASTM 743 A/ 743 M cast equivalents of wrought alloy types AISI 304 & AISI 316

Chemical Composition		SS 304	SS 316	Other equivalent /nearest alloy standards	
				SS304	SS316
Chromium	Cr	18.0%-20.0%	19.0%-21.0%		
Nickel	Ni	8.0%-11.0%	9.0%-12.0%	DIN 1.4312, 1.4301	1.4401, 1.4404
Carbon	C	0.08%-0.40%	0.08%-0.40%	1.4305, 1.4303	1.4581, 1.4585
Molybdenum	Mo	0.50% max	2.0%-3.0%	1.4309	1.4401, 1.4436
Niobium	Nb	As appropriate	As appropriate	BS 304-S11, S 15	316- S11, S13, S14,
Titanium	Ti	As appropriate	As appropriate	S16, S17, S31	S17, S19, S31
				C25	

Alloys contain Mn, Si, S, P, Fe and other trace elements.

Note: The IS 9301: 1990 recommends stainless steel to be used for connecting and plunger rods is equal to AISI 410 grade with Cr (11.0%-13%), Ni (1%) and C (0.12%-0.25%) where pH value of ground water is higher than 5.5.

Stainless steels options for application in deep well hand pump components

		SS 301	SS 304	SS 304 Ti	SS 304 Nb	SS 316	SS 316 Ti	SS 316 Nb
Chromium	Cr	16.0-18.0	18.0-20.0	18.0-20.0	18.0-20.0	19.0-21.0	19.0-21.0	19.0-21.0
Nickel	Ni	6.0-8.0	8.0-11.0	8.0-11.0	8.0-11.0	9.0-12.0	9.0-12.0	9.0-12.0
Molybdenum	Mo	0.50 max	0.50 max	0.50 max	0.50 max	2.0-3.0	2.0-3.0	2.0-3.0
Titanium	Ti	-	-	Yes	-	-	Yes	-
Niobium	Nb	-	-	-	Yes	-	-	Yes

Note: The table above indicates key elemental percentage composition ranges of corrosion resistant stainless-steel cast components. Conditions apply. Metallurgical casting feasibility of an alloy depends on its geometry and dimensions.

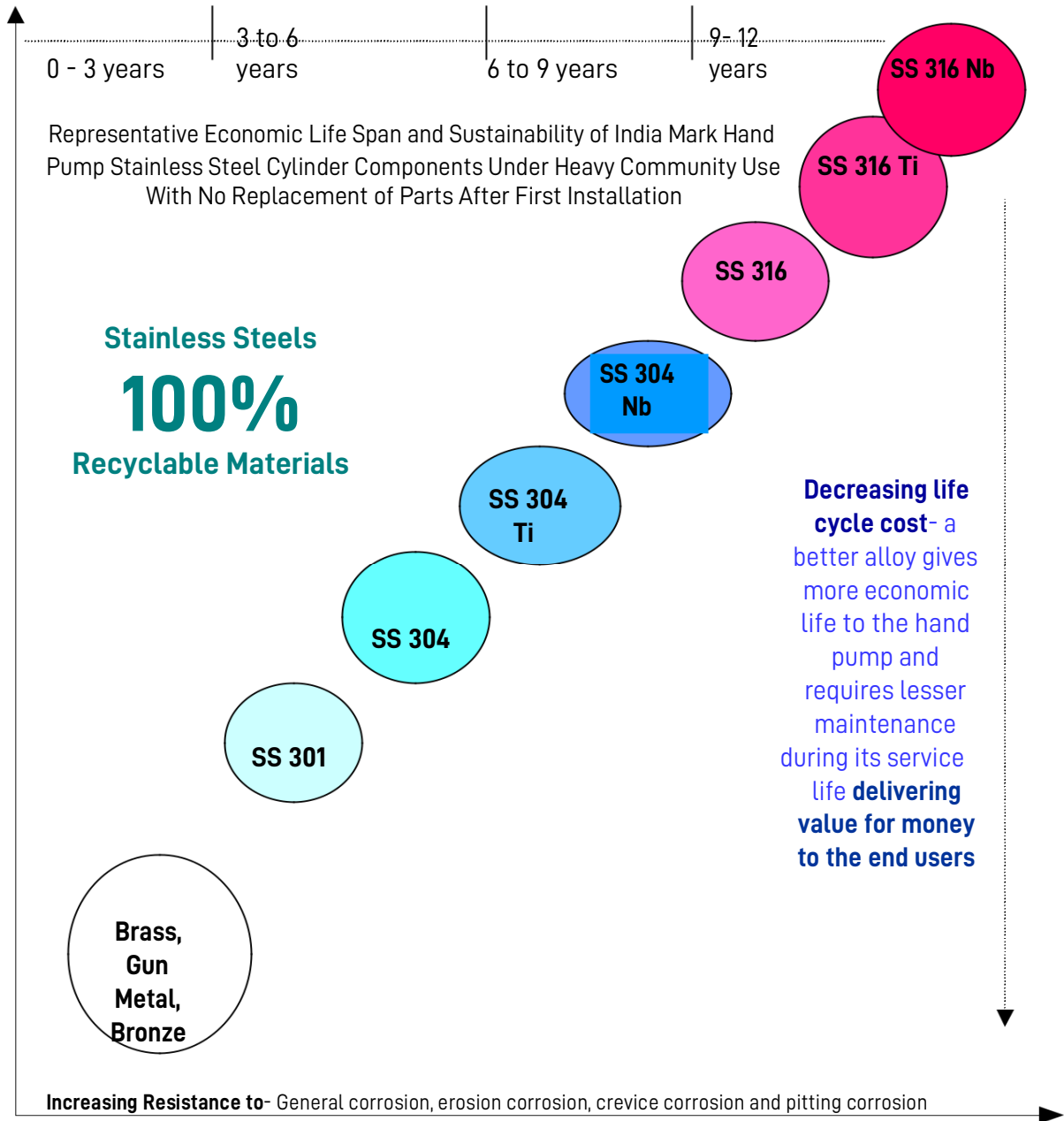
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Cost of the alloy

Total service life of a stainless-steel cylinder component hand pump is 15-25 years



Increasing improved physical properties, **improved weld-ability** and **capability to withstand higher pH value of water**
Increasing ability to combat and withstand - grain segregation, carbide precipitation, stress corrosion cracking, corrosion fatigue, inter granular corrosion