

MATERIAL GUIDE FOR VERTICAL SUSPENDED PUMPS (1)

MATERIAL CODE	VFB1	VKA	VKA1	VSX	VSI	VK	VSZ (2)
BOWL OR CASING	A278 CL30	A216 WCB	A216 WCB	A487 CA6NM	A743 CF8M	A352 (3)	SPECIAL STAINLESS
IMPELLER	A48 CL30	A216 WCB	A487 CA6NM	A487 CA6NM	A743 CF3M OR CF8M	A352 (3)	SPECIAL STAINLESS
BOWL WEAR-RINGS (4)	A48 CL30	A276 410 (5)	A276 410 (5)	A276 410 (5)	A276 XM33	B584 C93700	SPECIAL STAINLESS (6)
IMPELLER WEAR-RINGS (4)	A48 CL40	A276 410 (5)	A276 410 (5)	A276 410 (5)	A276 XM19	B148 C95400 HT	SPECIAL STAINLESS (6)
COLUMN/BOWL SHAFT BUSHINGS	A436 TYPE 1b	D4745 TYPE 8 (7)	D4745 TYPE 8 (7)	D4745 TYPE 8 (7)	D4745 TYPE 8 (7)	B584 C93700	D4745 TYPE 8 (7)
SHAFT (8)	A276 410 (5)	A322 4140	A322 4140 (16)	A276 410 (5) (16)	A276 XM19	A322 4140	INCONEL 625 (9)
SHAFT SLEEVE PACKED PUMPS	A276 410 (5)	NA	NA	NA	316L (6)	NA	NA
RISER COLUMN, SHAFT ENCL. TUBE & SIDE DISCH. PIPE	A106 GR. B	A106 GR. B	A106 GR. B	A106 GR. B	A312 TYPE 316L	A333 GR. B	UNS N08024
DISCHARGE HEAD	A278 CL30	A216WCB OR A516 GR70	A216WCB OR A516 GR70	A487 CA6NM	A240 316L	A352 (3)	UNS N08024
MOTOR SUPPORT & MOUNTING FLANGE	A48 CL40	A216WCB OR A516 GR70	A216WCB OR A516 GR70	A216WCB OR A516 GR70	A216WCB OR A516 GR70	A216 WCB OR A516 GR70	A216 WCB OR A516 GR70
SUCTION BARREL	A106 GR. B (10)	A106 GR. B (10)	A106 GR. B (10)	A106 GR. B (10)	A312 TYPE 316L	A333 GR. 6	UNS N08024
SUCTION STRAINER	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS	UNS N08024

NON-WETTED BOLTING MATERIAL (11)			
	ALL MAT. CODES EXCEPT CODES VK AND VSZ	MATERIAL CODE VK	MATERIAL CODE VSZ
STUDS	ASTM A193 GRADE B-7	ASTM A320 GR. L43	ASTM A193 GRADE B8R
NUTS	ASTM A194 GRADE 2H	ASTM A194 GRADE 7 S3	ASTM A194 GRADE 8R

DRAIN, VENT AND MECH. SEAL PIPING			
	MATERIAL CODES VFB1 & VKA	MATERIAL CODES VSX, VSI & VK	MATERIAL CODE VSZ
PIPE	ASTM A106 GRADE B	ASTM A312 TP 316L	UNS N08024
FITTINGS	ASTM A105	ASTM A182 F316L	UNS N08024

- (8) FOR OIL OR SWEET WATER LUBRICATED LINE SHAFT ASSEMBLY, USE ASTM A322 4140. FOR RAW WATER LUBRICATED LINE SHAFT ASSEMBLY , USE ASTM A276 XM19.
- (9) ASTM A182 F55 / A276 UNS 32760 IS AN ACCEPTABLE MATERIALS FOR SHAFT IF APPROVED BY STANDARD COMMITTEE CHAIRMAN, PUMPS, SEALS AND MIXERS.
- (10) WITH THE EXCEPTION OF DRY HYDROCARBON SERVICES, BARREL TO BE INTERNALLY COATED WITH EPOXY. FOR SERVICES THAT HAVE WATER TABLE REACH PUMP BARREL, THE BARREL SHALL ALSO BE EXTERNALLY COATED WITH EPOXY. THE EPOXY COATING SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF 09-SAMSS-067.
- (11) WETTED FASTENERS SHALL BE COMPATIBLE WITH THE PUMP METALLURGY AND PUMPED LIQUID.
- (12) THE USE OF WELD OVERLAY REQUIRES THE APPROVAL OF STANDARD COMMITTEE CHAIRMAN; PUMPS, SEALS AND MIXERS. WELD OVERLAY MUST CONSIST OF AT LEAST FOUR LAYERS OF WELD METAL TO ACHIEVE UNDILUTED WELD METAL COMPOSITION AFTER FINAL MACHINING. REFER TO SAES-W-014. ADDITIONAL LAYERS MAY BE NEEDED FOR INCREASED EROSION AND CORROSION RESISTANCE. ONLY GMAW, GTAW OR PTAW PROCESS ALLOWED. CONFIRM OVERLAY COMPOSITION BY PMI PER SAES-A-206. EACH WPS TO BE APPROVED BY THE COORDINATOR OF ME&CCD/CSD.
- (13) ALL WELD REPAIRS ON THE WETTED SURFACE SHALL HAVE PWHT PER ASTM A743 S13 INCLUDING S3 & S5 (FOR MINOR AND MAJOR REPAIRS) AND S2 & S7 (FOR MAJOR REPAIRS ONLY).
- (14) MATERIAL MUST HAVE 40-60% FERRITE FOR BASE METAL AND 30-60% FOR WELD JOINTS, AND SHALL COMPLY WITH SUPPLEMENTARY REQUIREMENT S50. ALL WELD REPAIRS ON THE WETTED SURFACE SHALL HAVE PWHT PER ASTM A995 S11 INCLUDING S6 & S10 (FOR MINOR AND MAJOR REPAIRS) AND S5 & S12 (FOR MAJOR REPAIRS ONLY).
- (15) MATERIAL MUST HAVE 40-60% FERRITE FOR BASE METAL AND 30-60% FOR WELD JOINTS, AND SHALL COMPLY WITH SUPPLEMENTARY REQUIREMENT S31. ALL WELD REPAIRS ON THE WETTED SURFACE SHALL HAVE PWHT PER ASTM A890 S33 INCLUDING S3 & S5 (FOR MINOR AND MAJOR REPAIRS) AND S2 & S34 (FOR MAJOR REPAIRS ONLY).
- (16) FOR WET HYDROCARBON, THE SHAFT MATERIAL SHALL BE A276 XM19.

NOTES:

- (1) FOR PUMPS IN SOUR SERVICE, MATERIALS SHALL MEET THE REQUIREMENTS OF SAES-A-301, WHERE APPLICABLE.
- (2) MATERIALS LISTED BELOW ARE ACCEPTABLE. OTHER MATERIALS ARE ALSO ACCEPTABLE PROVIDED THAT THEIR PREN=40 MINIMUM AND VENDOR DEMONSTRATES SUCCESSFUL EXPERIENCE ON SIMILAR WATER COMPOSITION:
- ASTM A743/A744 CN3MN (UNS J94651) / ASTM A182 F62 (UNS S08367)(MIN PREN 40) (13)
- ASTM A743/A744 CK3MCuN (UNS J93254) / ASTM A182 F44 (UNS S31254)(MIN PREN 40) (13)
- ASTM A351 CK3MCuN (UNS J93254) / ASTM A182 F44 (UNS S31254) (MIN PREN 40) (13)
- ASTM A995 5A (UNS J93404) / ASTM A182 F53 (UNS S32750) (MIN PREN 40) (14)
- ASTM A995 6A (UNS J93380) / ASTM A182 F55 (UNS S32760) (MIN PREN 40) (14)
- ASTM A890 1C (UNS J93373) / ASTM A182 F61 (UNS S32550) (MIN PREN 40) (15)
- ASTM A105 WELD OVERLAID WITH AWS A5.14 ERNiCrMo-3 (UNS N06625) (12)
- NOTE:** PREN = %Cr + 3.3 X %Mo + 16 X %N. MATERIALS SHALL BE IN THE SOLUTION ANNEALED CONDITION AFTER WELDING, GALVANICALLY COMPATIBLE AND SHALL HAVE SIMILAR COMPOSITION IF WELDED.
- (3) MANUFACTURER TO PROPOSE A SUITABLE MATERIAL GRADE FOR THE SERVICE.
- (4) FOR MATING WEAR PARTS HAVING HARDNESS LESS THAN BHN 400, THEY SHALL HAVE A HARDNESS DIFFERENCE EQUIVALENT TO BHN 50.
- (5) ALL TYPE 410 (ALTERNATIVELY 420) MARTENSITIC STAINLESS STEEL MUST BE IN THE QUENCHED AND TEMPERED CONDITION. NITRONIC 50/60 AND A743 CA15 ARE ACCEPTABLE ALTERNATIVE MATERIALS FOR WEAR RINGS. A276 TYPE 420 SHALL NOT BE USED FOR SOUR SERVICES.
- (6) IMPELLER WEAR RINGS, SHAFT SLEEVES AND CASING WEAR RINGS SHALL BE OVERLAID WITH HARD MATERIALS. MANUFACTURER STANDARD MATERIALS ARE ACCEPTABLE PROVIDED THAT THE PROPOSED MATERIALS ARE USED IN SIMILAR SERVICE AND ARE OPERATING SUCCESSFULLY.
- (7) GRAPH ALLOY IS AN ACCEPTABLE ALTERNATIVE MATERIAL FOR BUSHINGS IN CLEAN SERVICES.

05	11/28/06		ADDED "IN CLEAN SERVICES" IN NOTE NO.7	HAZZA			HAZZA
04	01/21/06		GENERAL RIVISION				
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CONSTRUCTION AGENCY _____

OPERATIONS _____

OTHER _____

MATERIAL GUIDE FOR CETRIFUGAL PUMPS				DRAWING TYPE
VERTICAL SUSPENDED				STD
STD. DWG.			SAUDI ARABIA	
PLANT NO.	INDEX	DRAWING NUMBER	SHT.NO.	REV. NO.
990	G	AD-036821	2 OF 2	05

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