


TOWNLEY
Engineering & Manufacturing Co., Inc.
FOUNDRY
GR4R+N
CHEMICAL COMPOSITION

C	Mn	Si	Cr	Ni
PROPRIETARY	PROPRIETARY	PROPRIETARY	27%	8%
Cu	Mo	N	FERRITE BASE	
4%	5%	0.50 MAX		

MECHANICAL PROPERTIES

<u>COMPARISON</u>	<u>TENSILE STRENGTH</u>	<u>HARDNESS</u>
ALLOY G4R + N	120-150 K.S.I.	280-320 HB
HASTELLOY G-30 (AND OTHER NICKEL COBALT BASE ALLOYS.)	60-90 K.S.I.	120-180 HB

THE HIGH PURITY, 27% Cr – 5% Mo – 8% Ni – 4% Cu, ALLOY IS THE RESULT OF A DEVELOPMENT EFFORT AT TOWNLEY FOUNDRY & MACHINE CO. THE AIM OF THIS INVESTIGATION WAS TO DEVELOP AN Fe-Cr-Ni-Mo-Cu ALLOY WHICH WOULD POSSESS THE MAXIMUM PITTING, CREVICE AND ABRASION RESISTANCE WHILE RETAINING GOOD RESISTANCE TO CHLORIDE STRESS CORROSION CRACKING AND MAINTAINING GOOD WELDABILITY.

STARTING WITH MELTING, G4R + N ALLOY GOES THROUGH A SPECIAL REFINING PROCESS AS WELL AS A FINAL INOCULATION PROCEDURE. THIS IS DESIGNED TO CLOSELY CONTROL THE NITROGEN CONTENT AND INCLUSION SHAPE, WHILE IMPROVING DEOXIDIZATION AND SIGNIFICANTLY REDUCING THE SULFUR, PHOSPHORUS AND HYDROGEN. THE RESULTING CASTINGS HAVE UNUSUALLY SMALL GRAIN SIZE AND A HARDNESS RANGE BETWEEN 300 AND 400 HB AS DESIRED.

AFTER SHAKE OUT, THE CASTING UNDERGOES A UNIQUE HEAT TREATMENT PROCESS DESIGNED TO COMPLETELY ELIMINATE THE SIGMA AND ALPHA PRIME PHASES SO DETRIMENTAL TO CORROSION RESISTANCE.

THE UNIQUE CASTING AND HEAT TREATMENT TECHNOLOGY OF G4R+N MAKE POSSIBLE THE INCREASE TO Mo CONTENT UP TO 5% WHICH IS DOUBLE THAT FOUND IN OTHER Fe-BASE STAINLESS STEELS. THIS REPRESENTS NEARLY THE HIGHEST Mo CONTENT WHICH CAN BE SUSTAINED IN AN IRON BASE ALLOY, WITHOUT UNDUE COMPLICATIONS IN THE CASTING PROCESS.

THE HIGH Mo CONTENT, WITH PROPER CONTENT OF Cr, Ni, Cu AND HIGH NITROGEN CONTENT ENHANCE THE DEVELOPMENT OF THE PASSIVE FILM RESPONSIBLE FOR THE EXCELLENT CORROSION RESISTANCE OF G4R+N. BOTH LABORATORY TESTS AND PRACTICAL APPLICATIONS OF G4R+N CASTINGS DEMONSTRATED THAT G4R+N PROVIDES THE BEST RESISTANCE OF ANY METALLIC MATERIAL TO WET PROCESS PHOSPHORIC ACID AND PRODUCES EXCELLENT PERFORMANCE IN SOLUTIONS CONTAINING HYDROFLUROSILICIC ACID AND GOOD RESISTANCE TO SULFURIC ACIDS.

IN ADDITION, G4R+N IS MUCH BETTER THAN HIGH-PERFORMANCE ALLOYS AND SUPER-STAINLESS STEELS IN A VARIETY OF MIXED ACID SERVICES. AT THE SAME TIME, G4R+N IS AT LEAST TWICE AS HARD AS ANY HASTELLOY NICKEL BASED ALLOY.

G4R+N HAS, IN MANY INSTANCES, SUCCESSFULLY REPLACED HASTELLOY G-30 AND OTHER NICKEL BASE ALLOYS IN WET PROCESS PHOSPHORIC ACID SERVICES, ESPECIALLY WHERE THERE IS A COMBINATION ABRASION AND CORROSION (SLURRY PUMP PARTS). SUCCESS IN PRACTICAL SERVICE PERFORMANCE IN A VARIETY OF APPLICATIONS HAS PROVEN THAT THE G4R+N ALLOY IS A MOST EFFECTIVE ALTERNATIVE TO THE MORE EXPENSIVE NICKEL OR COBALT BASE AND TITANIUM BASE ALLOYS.

COMPATIBLE WELDING ROD – SANDVIK 25.10.4.LR OR FERROLIUM 255

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