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RE: HARDNESS EVALUATION – IC 52100 SEAR SPRING GUIDE MATERIAL

HISTORY

The sear spring guide for the SPL fire-control is currently being proposed to be cast from I.C. 52100 material. Ideally, the part would be used in the as-cast condition with no additional heat treatment. To determine a maximum hardness specification for the part, a potential vendor has sent to Remington Arms Company a few sample of parts cast using the I.C. 52100 material. These samples were evaluated for hardness in the as-cast condition to aid in determining the proper specifications that would be applied to the Remington part.

SUMMARY / RECOMMENDATIONS

Table 1 presents the measured hardness for four of the samples received from the casting vendor. There is some slight variation between the hardness of the tested samples. These small variations (a few hardness points between parts) are typically due to casting parameters which control the solidification and cooling rate of the parts at different locations within the casting tree. Based on the acquired hardness numbers, it is recommended that the specification be changed to a maximum hardness of HRc 41 in the as-cast condition.

IC 52100 Cast Sample Hardness								
	Measured Hardness (HRc)							
Sample	1	2	3	4	5	6	Average	St. Dev.
1	35.0	37.2	36.0	34.0	35.6	34.9	**35.5**	1.1
2	34.9	36.1	35.1	35.0	37.3	31.8	**35.0**	1.8
3	36.5	39.2	35.6	37.0	37.0	36.7	**37.0**	1.2
4	39.1	39.0	38.1	34.5	36.6	35.6	**37.2**	1.9

Table 1. The hardness testing results from the supplied samples received from a potential casting vendor.

There is a notable size difference between the parts which were evaluated for this initial hardness test and the SPL sear spring guide in that the parts evaluated for this test are substantially larger in overall size. Due to this difference, the cooling rate of the SPL sear spring guides may be greater and result in a higher as-cast hardness of the Remington parts. The as-cast hardness is a secondary concern, as no secondary machining operations will be performed on the parts. The primary concern is the potential of having un-tempered martensite in the microstructure which could lead to a brittle type failure of the part in service. These parts should be evaluated once the as-cast parts become available to determine if there is any un-tempered martensite present. Further recommendations to combat this issue may result in a short heat treatment of the as-cast parts for production.