TABLE 4

DETERMINATION OF MICROTURBULENT VELOCITY FROM FEII LINES

Star	Species	n	ξ_1 km s^{-1}	log N/N_T	ξ_2 km s^{-1}	log N/N_T	gf-values
HR 3273	FeII	64	0.3	-4.75 ± 0.22	0.0	-4.74 ± 0.27	N4+KX+MF
		37	0.9	-4.87 ± 0.24	0.0	-4.80 ± 0.28	N4+MF
	adopted ξ:	0.3 km s^{-1}					
HR 8118	FeII	63	1.0	-4.36 ± 0.21	0.0	-4.28 ± 0.28	N4+KX+MF
		37	1.2	-4.41 ± 0.24	0.0	-4.27 ± 0.26	N4+MF
	adopted ξ:	0.5 km s^{-1}					
HR 8567	FeII	56	0.0	-4.91 ± 0.21	0.0	-4.91 ± 0.28	N4+KX+MF
		33	0.5	-4.99 ± 0.24	0.0	-4.98 ± 0.26	N4+MF
	adopted ξ:	0.1 km s^{-1}					
HR 8937	FeII	80	0.9	-4.32 ± 0.21	0.0	-4.27 ± 0.28	N4+KX+MF
		39	1.1	-4.40 ± 0.24	0.0	-4.29 ± 0.26	N4+MF
	adopted ξ:	0.5 km s^{-1}					

Note: the source of gf values are KX (Kurucz & Bell 1995), MF (Fuhr, Martin, & Wiese 1988) and N4 (Fuhr & Wiese 2006).

The adopted metal line damping constants were the default semi-classical approximations except for those of neutral and singly-ionized Ca-Ni lines, whose values are based on the data of Kurucz & Bell (1995). For the lines of CII, multiplet 6, and MgII, multiplet 4, the adopted values for Stark broadening were based on data of Sahal-Brechot (1969), and for SiII and CaII, the damping constants are those of Lanz, Dimitrijevic, & Artru (1988), and Chapelle & Sahal-Brechot (1970) respectively. We prefer this choice of gf values to the VALD database (Piskunov 1996) to ensure homogeneity with our previous work.

To determine the abundances we need an initial estimation of the microturbulent velocity (ξ). For this estimation we have used the standard method. We computed abundances from the FeII lines for a range of possible microturbulent velocities (ξ). For determining the final values (Table 4), we looked for the conditions that the abundances of FeII were not dependent on the equivalent widths (ξ_1) or that they minimize the rms scatter of the abundances (ξ_2). Values for each species were derived using lines with gf values from 3 different sources: KX values (Kurucz & Bell 1995), MF values (Fuhr et al. 1988) and N4 values (Fuhr & Wiese 2006). The sources of gf values shown in the last column of Table 4 determine the number of lines, n. The values derived for the microturbulence using the FeII lines are 0.32 km s^{-1}, 0.55 km s^{-1}, 0.13 km s^{-1} and 0.52 km s^{-1}, for the HgMn stars HR 3273, HR 8118, HR 8567 and HR 8937, respectively. Once a ξ value has been fixed the abundances corresponding to all chemical species measured are determined using the WIDTH9 code.

In our abundance determination we did not include seriously blended lines. To give an idea of the sensitivity of our results, raising the temperature of HR 3273 by ∼4% (500 K) increases the average abundance by ∼2%, and raising the surface gravity by ∼15% (0.5 dex) increases the average abundance by ∼0.5%. Table 5 shows the sensivity of the results for the abundances to these changes.

We present in the Table 6 the He/H ratios derived comparing the observed HeI line profiles with synthetized spectra. We used the program SYNTHE under the LTE condition; the results were convolved with the rotational velocity of the star and the instrumental broadening of the spectrograph. The mean derived He/H values are 0.07, 0.09, 0.08 and 0.03, for the stars HR 3273, HR 8118, HR 8567 and HR 8937, respectively.

Previous works in literature derived the Hg abundance taking into account the isotopic and hyperfine structure, using higher resolution spectra and S/N than ours (Woolf & Lambert 1999; Dolk et al. 2003). They determined the isotopic mixture for the line HgII $\lambda\lambda$3984 using similar values of $T_{\rm eff}$ and log g. We adopted the Hg abundance derived by these authors for HR 3273 (-5.25 ± 0.32 dex), HR 8567 (-5.58 ± 0.37 dex) and HR 8937 (-4.23 ± 0.43 dex). These values are comparable to those derived using the equivalent width of $\lambda\lambda$ 3984, and LTE model atmosphere, i.e. -4.83 dex, -5.39 dex and -4.06 dex,