white and silky; they are characterized by a low content of accompanying minerals, which furthermore almost always consist of talc. In part the length of the fibers is great, the fibers spin well, and the material has other desirable fibrous characteristics. An outstanding feature is the uniformity of composition in these chrysotiles:

SiO_2	41 to 42%
Al_2O_3	0 to 2%
FeO	0 to 1% (no Fe_3O_4, Fe_2O_3
Na_2O, CaO	0 to 3%
MgO	36 to 42%
H_2O	14 to 18%

TABLE 5

MAGNETITE CONTENTS OF ASBESTOS

Variety	*Fe_3O_4 content* (%)	*Magnetic rating* [1] (MR)
Chrysotiles		
Quebec	0.5 to 5.0 [2]	0.8 to 6.7
Shabani, Southern Rhodesia	0.5 to 2.0 [3]	—
Asbest, Ural		—
McDame, British Columbia	0 to 0.7	0.7 to 1.3
Barberton, Transvaal	("low iron	0.1 to 0.3
Lobatsi, Bechuanaland	chrysotiles")	0.3
Crocidolites	3.0 to 5.9 [2]	
Cape blue	—	0.4 to 2.0
Transvaal blue	—	2.1
Australian blue	—	5.4
Anthophyllite asbestoses	none	—
Georgia, USA	—	0.1
Mozambique	—	0.6
Amosite	none	0.2 to 0.3
Tremolite asbestos	none	—

[1] MR values after Badollet and Edgerton
[2] Difficult to remove mechanically
[3] Readily removed mechanically

Chrysotiles of the composition shown above, free of Fe_3O_4 are formed from serpentines in accord with the principle outlined schematically in part *d* of 2.1 whereas chrysotiles coming from serpentines through the processes described in *a* and *b* contain larger or smaller amounts of Fe_3O_4 (e.g., up to 4% in Quebec; see Table 5). The high content of magnetite is not the sole determining factor, however, but in the case of chrysotiles containing relatively much Fe_3O_4 — in contrast to low-iron chrysotiles — the extent to which this compound adheres to the fibers and the ease with which it can be removed by mechanical disintegration are also decisive. Examples of chrysotiles with weakly-adhering magnetite include the fibers from Shabana (Southern Rhodesia) and from Asbest (Urals). See Table 5.

On the other hand, as it is very difficult to remove the magnetite from Quebec chrysotile mechanically other methods (discussed in detail in Part II) must be employed in the processing of this type of asbestos rock. In general, the content of magnetite falls as it is more widely distributed, as the degree of disintegration rises, or as the fibers become shorter. The chrysotiles intended for the fabrication of electrical insulants are divided by the US Military Specification MIL-3053 A (August 3, 1951) into the following classes, without regard to their origin or pretreatment of the fibers:

Class	*Total iron content max. %*	*Fe_3O_4 content max. %*
2	2.5	0.75
4	4.0	2.0
6	6.0	4.0

When conducted by the procedures given in DIN 51070-72,* the chemical determination of the content of Fe_3O_4 in asbestoses is so complicated by the simultaneous presence of Fe(II) and Fe(III) that at present the magnetite content is ascertained electronically (oscillograph in combination with visual and recording equipment). When samples of asbestos containing much magnetite are being studied, the signal effect may be distinctly above the signal level of the measuring devices. The best procedure has been found to be the methods prescribed in ASTM D 1118-57, which employs the Mapes analyzer. The found MR-values (magnetic ratings, Mapes ratings) are comparative values based on a standard substance with a known content of Fe_3O_4; they may not be equated directly with the magnetite content.

Among the most important general findings obtained with the Mapes device is the observation that the same quantities of a sample with known magnetite content give decreasing MR-values

* Methods of Reinhardt-Zimmermann, Viswanthan-Suryaraman, Stschigol-Burtschinskaja: lead platinum apparatus, hydrofluoric acid decomposition in stream of CO_2, etc.