

ALIEN PROPERTY CUSTODIAN

HIGH GRADE STEELS FOR BUILDING PURPOSES

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Recently it has been discovered, that the commonly used high grade steels for building purposes, which up to the present are used in rolled state, possess certain inconveniences in so far as, when they are used in thicker dimensions, unfavourable physical properties occur in the interior of the sections, especially a comparatively low notch strength. If the bending tests, which have been recently proposed for the testing of steels for building purposes with longitudinally welded on caterpillar weld are carried out, surprisingly small bending angles are ascertained at the testing of the commonly used steels for building purposes at the moment when the bending test is applied to section cross-sections which are thicker than 30 mm. The bad notch test values and also the small bending angles of the commonly used steels for building purposes at the caterpillar weld bending test do not make it advisable to employ these steels for big welded building elements. Quite recently a number of accidents have really occurred in building constructions, in which section thicknesses of more than 30 mm. have been employed.

By thorough experiments it has been proved, that these inconveniences of the commonly used high grade steels for building purposes do not occur, if steels are employed which have been obtained by melting according to metallurgical points of view. Surprisingly it has been ascertained, that the physical properties of the high grade steels for building purposes remain very favorable also when employed as thick sections, provided these steels had been smelted as "fine-grained steels." The testing to fine grain is effected according to the method of Ehn. Such steels are called fine-grained steels, which at the cementation test by Ehn show a grain size in the class 5 to 8. The improvement of the physical properties of the steels for building purposes, especially their favorable behaviour at the testing of the notch strength and at the weld caterpillar bending test, occur fundamentally in all the instances, in which the metallurgical treatment of the steel has been carried out so that a fine-grained steel is produced. It has further been ascertained that it is immaterial, in which manner the fine-grained steel has been produced, be it for instance by special carrying out of the boiling period, be it by smelting overheating, be it by addition of aluminum or by special alloying.

A particularly extensive improvement of the notch test as well as of the behaviour at the weld caterpillar bending test takes place if these fine-grained steels are submitted to a normalising reheating or to a heating above A_c3 and to subsequent accelerated cooling. Also the refining treatment causes in these fine-grained steels a considerably stronger improvement of these properties than is the case with coarse-grained steels.

Example

50 mm. thick sections, steel for building purposes St 52, analysis:

C	Si	Mn	Cr	Cu
Per cent 0.18	Per cent 0.43	Per cent 1.08	Per cent 0.35	Per cent 0.45

		Ehn grain-test	Notch test strength at DVMR test from the core of the section	Bending angle weld caterpillar bending test 50 mm
			Mkg/cm ²	Degrees
1	Steel for building purposes of usual manufacture Rolling state.	Class 2...	4	8
2	Steel for building purposes smelted as fine-grained steel Rolling state.	Class 6...	10	12
3	Steel for building purposes as fine-grained steel obtained by smelting, normally reheated.	Class 6...	16	25

These examples show, that it has been possible to produce welded building elements from steels for building purposes which, also in thick dimensions, show excellent properties down to the core as regards notch test strength and bending test. By the employment of steels for building purposes according to the invention it is possible to produce large welded building elements with employment of heavy rolled sections. The employment of heavy sections is more economical than the putting together of heavy girders from thin individual lamellae. It is advisable, to make use of the invention at the production of welded building elements from sections with more than 25 mm. thickness.

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