

STEEL FLAT PRODUCTS WELDABLE EXTRA- MILD FOR COLD ROLLED PRESSING

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THIS NORME REPLACES NORMES B53 3110

This is a translation, the French original shall be used in all cases of litigation

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1. OBJECT

This norme defines the specific requirements for steel, flat products, extra-mild, non-alloy, cold rolled (LAF) for pressing, non coated or coated before or after forming and with a thickness less than 3 mm delivered in the form of :

- sheet
- wide strip and wide slit strip in coils
- strip in coils or flats.

It must be accompanied by the documents defining the general requirements for flat products :

- B53 3020 Designations - Symbols.
- B53 3050 General requirements for supply.
- B53 3055 Metallurgical requirements - Tests.
- B53 3070 Specific technical requirements.
- B53 3072 Dimensional requirements.
- B53 3075 Specific technical requirements for cold rolled strips.
- B53 3077 Dimensional requirements for cold rolled strips.

2. EXPRESSION ON DOCUMENTS

The material is defined in the following form :

MATERIAL : STEEL SHEET followed by the material grade, then by the reference of this norme
Nominal THICKNESS delivered in mm and surface APPEARANCE Z if the part is visible.

Example :

MATIERE : TOLE ES PSA B53 3106 EP : 0.67 MM. ASPECT Z

(MATERIAL : STEEL SHEET ES PSA B53 3106 TH : 0.67 MM. APPEARANCE Z)

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3. CHARACTERISTICS OF PRODUCTS IN THE DELIVERY CONDITION

3.1. GENERAL

The products shall be free from defects detrimental to their use.

They shall be suitable for pressing, welding, bonding and paint coating.

They may be supplied with the surface texture X or Z defined in norme B53 3070.

These products are annealed and skin passed.

3.1.1 CHEMICAL COMPOSITION (%)

GRADE	DESIGNATION		Ceq (1) max.	C max.	Mn max.	Si max	P max.	S max.	Al (2)
	SHEET	STRIP							
C	XC	FFC	0,18	0,10	0,50	0,10	0,045	0,050	0,020
E	XE	FFE	0,16	0,10	0,50	0,10	0,035	0,035	0,020
	ZE								
ES	XES	FFES	0,14	0,08	0,40	0,10	0,025	0,025	0,020
	ZES								

(1) Carbon equivalent $Ceq = C + \frac{Mn + Si}{6}$. Mandatory values.

(2) A lower aluminium content may be allowed as far as the process provides a complete combination of nitrogen guaranteeing a non ageing steel. These products will be made the subject of a specific requirement.

3.1.2 DERIVED GRADES

ABLE TO BE GALVANISED AFTER FORMING

C . R : Derived grades for dipped galvanising of parts after forming

E . R : « « «

ES . R : « « «

Only differs from the basic chemical composition by :

Si ≤ 0,03 %

and Si + 2,5 P ≤ 0,09 %

Note : The choice of derived grades involves, in all cases, functional tests and requires agreement from the appropriate Engineering Departments.

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3.2. MICROSTRUCTURAL CHARACTERISTICS

3.2.1. CLEANLINESS RELATING TO INCLUSIONS

The metal must be clean and without blowholes. The field of view with the highest count of non deformable inclusions must not exceed for each type of inclusion, the rating "2" from the JERNKONTORET scale in conformity with norme NF A 04-106.

3.2.2. STRUCTURE

The structure must be without decarburisation, non banded but with grain uniform in form and size. The grain sizes allowed, measured in accordance with norme NF A 04-102, are shown in the table in § 3.3.1.

3.3. MECHANICAL CHARACTERISTICS

3.3.1. SHEETS AND WIDE STRIP

These must be guaranteed for 6 months from the date of availability.
The tensile test specimens are taken from the transverse direction.
In the case where the width makes it impossible to sample test specimens in the transverse direction (slit strip), the values shown below may also apply to the longitudinal direction.
The test conditions are defined in norme B53 3055.

GRADE		Rp 0,2 (MPa) Transverse direction	Rm (MPa) Transverse direction	A% min. ISO 20 x 80	HRB max. (1)	r 18% Transverse direction	n 8 to 18% Transverse direction	GRAIN AFNOR min.
C (2)		140 260 (3)	280 380	28	65	-	-	4
E		180 230	300 360	34	57	≥ 1,3	≥ 0,17	5
ES	e ≤ 1,47	160 200	280 340	37	50	≥ 1,8	≥ 0,19	6
	1,47 < e < 1,95	160				≥ 1.6		
	e ≥ 1,95	210				≥ 1.5		

(1) Hardness (for information only) : average of 3 readings.

(2) Grade C is reserved for bending, flat cutting and roll forming within the allowable geometric tolerances.

(3) For the quality XC galvanised Rp 0,2 = 140 - 320 MPa; Rm = 280 - 420 MPa.

3.3.2. WORK HARDENED STRIPS

DESIGNATION	Rm (MPa)	HRB	HB	BENDING
FFE1	390 - 490	66 - 79	112 - 143	Complete bending transverse direction
FFE2	440 - 590	74 - 88	128 - 177	90° transverse direction
FFE3	540 - 680	86 - 95	161 - 207	Not specified
FFE4	≥ 640	≥ 91	≥ 192	Not specified

4. RECORDS AND REFERENCE DOCUMENTS

4.1. RECORDS

4.1.1. CREATION

- OR : 01/11/1991 – CREATION OF THE NORME.

4.1.2. SUBJECT OF THE MODIFICATION

- E : 18/07/2001 – WITHDRAWAL OF GRADE E180BH FOR THE CREATION OF A SPECIFIC NORME FOR BH STEELS.
- D : 11/05/1999 – § 3.3.1. CM EXTENDED TO LONGITUDINAL DIRECTION FOR SPLIT STRIP AND MODIFICATION OF R FOR SIGNIFICANT THICKNESSES

4.2 REFERENCE DOCUMENTS

4.2.1. PSA DOCUMENTS

4.2.1.1 Normes

B53 3020	STEEL – FLAT PRODUCTS – DESIGNATIONS - SYMBOLS
B53 3050	STEEL – FLAT PRODUCTS – GENERAL REQUIREMENTS FOR SUPPLY
B53 3055	STEEL OR ALUMINIUM FLAT PRODUCTS HOT OR COLD ROLLED – METALLURGICAL REQUIREMENTS - TESTS
B53 3070	STEEL – FLAT PRODUCTS – HOT OR COLD ROLLED – SPECIFIC TECHNICAL REQUIREMENTS
B53 3072	STEEL – FLAT PRODUCTS – HOT OR COLD ROLLED – DIMENSIONAL REQUIREMENTS
B53 3075	STEEL – FLAT PRODUCTS – COLD ROLLED STRIP – SPECIFIC TECHNICAL REQUIREMENTS
B53 3077	STEEL – FLAT PRODUCTS – COLD ROLLED STRIP – DIMENSIONAL REQUIREMENTS

4.2.1.2. Others

4.2.2. EXTERNAL DOCUMENTS

NFA04-102	STEEL INDUSTRY PRODUCTS – DETERMINATION OF THE FERRITIC OR AUSTENITIC GRAIN SIZE OF STEELS
NFA04-106	STEEL INDUSTRY PRODUCTS – METHODS OF DETERMINING THE NON-METALLIC INCLUSION CONTENT OF WELDABLE STEELS – PART II : MICROSTRUCTURAL METHOD WITH THE AID OF “IMAGE-TYPES”

4.3. EQUIVALENT TO :

4.4. CONFORMS TO :

4.5. KEY-WORDS

ACIER, EXTRA-DOUX, FROID, PRODUITS, PLATS
(Steel, extra-mild, cold, products, flat)