

**Belec Spektrometrie**  
**Opto-Elektronik GmbH**

**OES CALIBRATION SPECIFICATION**

**Instrument : Belec OPTRON**  
**Matrix : Fe - Base**

	<b>Fe-Ref.</b>	<b>Fe alloyed</b>	<b>Cr alloyed</b>	<b>Cr- Ni alloyed</b>
X	C	0.01 - 2.2	0.01 - 2.2	0.01 - 2.2
X	Si	0.01 - 3.5	0.01 - 3.5	0.01 - 3.5
X	Mn	0.01 - 2.5	0.01 - 2.5	0.01 - 2.5
X	P	0.005 - 0.45	0.005 - 0.45	0.005 - 0.45
X	S	0.005 - 0.15	0.005 - 0.15	0.005 - 0.15
X	Cu	0.01 - 1.4	0.01 - 4.0	0.01 - 4.0
X	Al	0.005 - 1.4	0.005 - 1.4	0.005 - 1.4
X	Cr	0.01 - 5.0	0.1 - 28.0	0.1 - 28
X	Mo	0.01 - 2.3	0.01 - 3.5	0.01 - 7.0
X	Ni	0.01 - 5.0	0.01 - 5.0	0.1 - 38.0
X	V	0.01 - 1.2	0.01 - 1.2	0.01 - 1.2
X	Ti	0.005 - 0.4	0.005 - 1.2	0.005 - 2.2
X	Nb	0.005 - 0.6	0.005 - 1.2	0.005 - 1.2
X	Co	0.01 - 1.4	0.01 - 1.4	0.01 - 1.4
X	W	0.01 - 3.0	0.01 - 3.0	0.01 - 1.5
X	Pb	0.01 - 0.15		
X	Sn	0.005 - 0.5	0.005 - 0.2	0.005 - 0.2

**X = Standard configuration**  
**O = Optional**

Additional elements or wider ranges on request

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**OES CALIBRATION SPECIFICATIONS**

**Instrument** : Belec OPTRON  
**Matrix** : Fe - Base (optional sub-programs)

	Fe-Ref.	O Free-Cutting Steel	O Free-Cutting Steel Cr alloyed	O Free-Cutting Steel Cr- Ni alloyed
X	C	0.01 - 2.2	0.01 - 2.2	0.01 - 2.2
X	Si	0.01 - 3.5	0.01 - 3.5	0.01 - 3.5
X	Mn	0.01 - 2.5	0.01 - 2.5	0.01 - 2.5
X	P	0.005 - 0.45	0.005 - 0.45	0.005 - 0.45
X	S	0.005 - 0.4	0.005 - 0.4	0.005 - 0.4
X	Cu	0.01 - 1.4	0.01 - 4.0	0.01 - 4.0
X	Al	0.005 - 1.4	0.005 - 1.4	0.005 - 1.4
X	Cr	0.01 - 5.0	0.1 - 28.0	0.1 - 28
X	Mo	0.01 - 2.3	0.01 - 3.5	0.01 - 7.0
X	Ni	0.01 - 5.0	0.01 - 5.0	0.1 - 38.0
X	V	0.005 - 1.2	0.005 - 1.2	0.005 - 1.2
X	Ti	0.005 - 0.4	0.005 - 1.2	0.005 - 2.2
X	Nb	0.005 - 0.6	0.005 - 1.2	0.005 - 1.2
X	Co	0.01 - 1.4	0.01 - 1.4	0.01 - 1.4
X	W	0.01 - 3.0	0.01 - 3.0	0.01 - 1.5
X	Pb	0.01 - 0.4		
X	Sn	0.01 - 0.5	0.01 - 0.2	0.01 - 0.2

X = Standard configuration  
O = Optional  
Additional elements or wider ranges on request

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**OES CALIBRATION SPECIFICATIONS**

**Instrument** : Belec OPTRON  
**Matrix** : Fe-Base (optional sub-programs)

	<b>Fe-Ref.</b>	<b>O</b> <b>High Mn + Cr</b>	<b>O</b> <b>High Mn + Cr + Ni</b>	<b>O</b> <b>HSS (Tool Steel)</b>
X	C	0.01 - 2.2	0.01 - 2.2	0.01 - 3.2
X	Si	0.01 - 3.5	0.01 - 3.5	0.01 - 1.2
X	Mn	0.01 - 20.0	0.01 - 20.0	0.01 - 1.3
X	P	0.005 - 0.45	0.005 - 0.45	0.005 - 0.1
X	S	0.005 - 0.1	0.005 - 0.1	0.005 - 0.1
X	Cu	0.01 - 1.4	0.01 - 4.0	0.01 - 0.5
X	Al	0.005 - 1.4	0.005 - 1.4	0.005 - 1.2
X	Cr	0.01 - 28	0.1 - 28	0.1 - 12
X	Mo	0.01 - 2.3	0.01 - 7.0	0.1 - 10
X	Ni	0.01 - 5.0	0.1 - 38.0	0.1 - 1.0
X	V	0.005 - 1.2	0.005 - 1.2	0.1 - 10.0
X	Ti	0.005 - 0.4	0.005 - 2.2	0.005 - 1.2
X	Nb	0.005 - 0.6	0.005 - 1.2	0.005 - 0.3
X	Co	0.01 - 1.4	0.01 - 1.4	0.1 - 10.0
X	W	0.01 - 3.0	0.01 - 1.5	0.1 - 21.0

**X = Standard configuration**

**O = Optional**

Additional elements or wider ranges on request

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**OES CALIBRATION SPECIFICATIONS**

**Instrument : Belec OPTRON**  
**Matrix : Cast Iron-Base**

	<b>Fe-Ref.</b>	<b>Cast Iron</b>	<b>O</b>	<b>Cr-Iron</b>	<b>O</b>	<b>Ni Resist Iron</b>
X	C	0.05 - 4.2	X	0.05 - 3.5	X	0.05 - 3.5
X	Si	0.05 - 4.8	X	0.05 - 1.6	X	0.05 - 3.5
X	Mn	0.01 - 2.0	X	0.01 - 1.6	X	0.01 - 7.0
X	P	0.005 - 1.1	X	0.005 - 0.2	X	0.005 - 0.2
X	S	0.005 - 0.2	X	0.005 - 0.12	X	0.005 - 0.15
X	Cu	0.01 - 0.7	X	0.01 - 2.0	X	0.01 - 6.0
X	Al	0.005 - 0.15	X	0.005 - 0.2	X	0.005 - 0.2
X	Cr	0.01 - 2.0	X	0.1 - 30.0	X	0.1 - 11.0
X	Mo	0.01 - 1.5	X	0.01 - 3.2	X	0.01 - 1.1
X	Ni	0.01 - 1.5	X	0.01 - 2.1	X	0.1 - 35.0
X	V	0.01 - 0.5	X	0.01 - 0.5	X	0.01 - 0.5
X	Ti	0.005 - 0.35	X	0.005 - 0.35	X	0.005 - 0.35
X	Nb	0.01 - 0.1	X	0.01 - 0.1	X	0.01 - 0.40
X	Co	0.01 - 0.2	X	0.01 - 0.2	X	0.01 - 0.2
X	W	0.02 - 0.1	X	0.02 - 0.1	X	0.02 - 0.1
X	Pb	0.01 - 0.05				
X	Sn	0.005 - 0.25				
X	Mg	0.005 - 0.1	X	0.005 - 0.05	X	0.005 - 0.05

**X = Standard configuration**  
**O = Optional**

Additional elements or wider ranges on request

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**OES CALIBRATION SPECIFICATIONS**

**Instrument** : Belec OPTRON  
**Matrix** : Al - Base

	<b>Al</b>	<b>Al</b>	<b>Al- Si &gt; 5%</b>
X	Si	0.01 - 5.0	0.1 - 24.0
X	Fe	0.01 - 3.2	0.01 - 1.5
X	Cu	0.01 - 9.5	0.01 - 4.5
X	Mn	0.01 - 1.5	0.01 - 1.0
X	Mg	0.01 - 10.2	0.01 - 2.5
X	Zn	0.01 - 11	0.01 - 11
X	Ni	0.01 - 3.5	0.01 - 3.5
X	Cr	0.01 - 0.45	0.01 - 0.2
X	Pb	0.01 - 1.6	0.01 - 0.2
X	Sn	0.01 - 1.0	0.01 - 1.0
X	Ti	0.01 - 0.3	0.01 - 0.25
X	Be	0.01 - 0.05	0.01 - 0.05
X	Zr	0.01 - 0.2	0.01 - 0.2
X	Co	0.01 - 0.3	0.01 - 0.3
X	V	0.01 - 0.15	0.01 - 0.15
<b>O</b>	Ag	0.01 - 0.7	0.01 - 0.7

**X = Standard configuration**  
**O = Optional**

Additional elements or wider ranges on request