

Iranian Light Source Facility Storage Ring Magnets

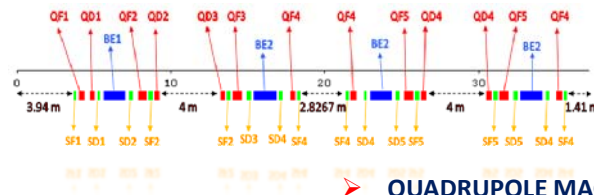
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Iranian Light Source Facility (**ILSF**) is a 3 GeV synchrotron. The storage ring consist of 32 combined bending magnets of 2 types with a field of 1.42, 104 quadrupoles in 9 families with a maximum gradient of 23 T/m and also 128 sextupoles in 9 families with a maximum sextupole component of 700 T/m². Using two dimensional codes POISSON and FEMM and RADIA a pole and yoke geometry was developed for all these magnets. ILSF has also attempted to design and build prototype magnets which are ongoing at this stage.

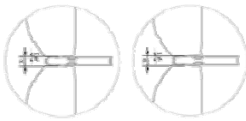
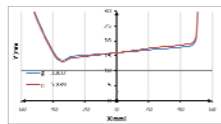
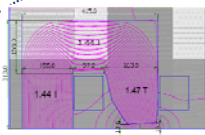
ABSTRACT

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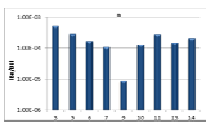
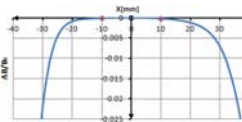


HALF SUPER PERIOD

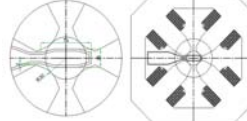
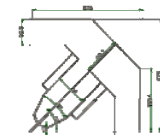
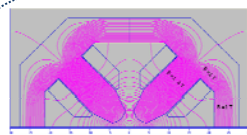
DIPOLE MAGNETS



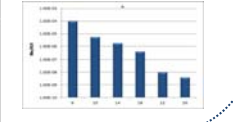
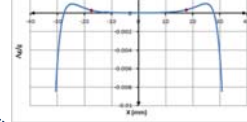
Parameter	unit	BE 1	BE 2
QTY	-	8	24
Bending radius	m	7.047	7.047
Deflecting angle	Deg.	11.25	11.25
Field	T	1.42	1.42
Field gradient	T/m	-3.837	-5.839
Total gap	mm	32	32
Magnetic length	m	1.384	1.384
Good field region	mm	±10	±10
Number of turns per coil	-	40	40
Conductor cross section	mm ²	143 × 11.4	143 × 11.4
Cooling channel diam	mm	6	6
Current	A	461.123	461.23
Current density	A/mm ²	3.42	3.42
Resistance of magnet	mΩ	42	42
Power consumption	kW	8.89	8.89
No. of cooling circuits	-	4	4
ΔT	deg	8.8	8.8
Water flow per circuit	l/min	3.62	3.62
Pressure drop	bar	8.86	8.87
Reynolds NO	-	6398.04	6401.5



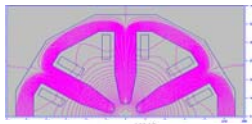
QUADRUPOLE MAGNETS



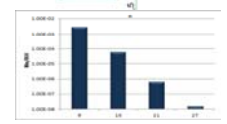
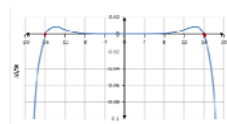
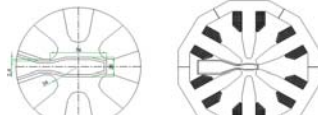
Parameter	unit	Value
QTY	-	104
Aperture radius	mm	30
Pole tip Field	T	0.690
Field gradient	T/m	23
Magnetic length	m	0.530
Good field region	mm	±18
Number of turns per coil	-	50
Conductor cross section	mm ²	8 × 8
Cooling channel diam.	mm	4
Current	A	168.2
Current density	A/mm ²	3.27
Resistance of magnet	mΩ	119
Power consumption	kW	3.37
No. of cooling circuits	-	4
ΔT	deg	10
Water flow per circuit	l/min	1.20
Pressure drop	bar	9.71
Reynolds Number	-	3204.50



SEXTUPOLE MAGNETS



Parameter	unit	Value
QTY	-	128
Aperture radius	mm	34
Pole tip Field	T	0.690
Field gradient	T/m ²	700
Magnetic length	m	0.22
Good field region	mm	±16
Number of turns per coil	-	34
Conductor cross section	mm ²	7 × 7
Cooling channel diam.	mm	3.5
Current	A	111.18
Current density	A/mm ²	2.82
Resistance of magnet	mΩ	85
Power consumption	kW	1.056
No. of cooling circuits	-	2
ΔT	deg	10
Water flow per circuit	l/min	0.75
Pressure drop	bar	8.87
Reynolds NO	-	2294.8



We would like to thank professor Dieter Einfeld for his continuous supports and helps

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