

Frame and Running Gear Data: HOS

I. STANDARD FRAME AND RUNNING GEAR ASSEMBLIES

A. Performance Characteristics

1.0 General	5HOS	6HOS	7HOS
Stroke (in.)	5.0	6.0	7.0
Rod Diameter (in.)	2.50	2.50	2.50
Max. Allowable Continuous Combined Rod Load MACCRL (lbs)	60,000	60,000	60,000
Max. Allowable Continuous Gas Load MACGL (lbs)	69,000	69,000	69,000
2.0 Ratings			
Number of Throws	2/4/6	2/4/6	2/4/6
Rated Speed (RPM)	1500	1200	1000
Minimum Operating Speed (RPM)	500	500	500
Nominal BHP/Throw at Rated Speed	1200/1200/1200	1000/1000/1000	1100/1100/1000
Angle Between Pairs of Compressor cranks (degrees)	0/90/120	0/90/120	0/90/120
Average Compressor Piston Speed at Rated Speed (ft./min)	1250	1200	1167
Rod Length / Crank Radius	6.40	5.33	4.57

Crankshaft rotation is counter clockwise from pump end view.

B. Product Specification for HOS Frames

1.0 Frame Configuration - Multi-throw, balanced-opposed rigid alloy-iron frame heavily ribbed and reinforced with integrally cast crosshead extensions. Open frame top construction with steel tie rods and individually fitted cast iron spacers over each main bearing. Gasketed doors in top and sides permit easy access to running gear. Inside painted with oil proof white primer paint. Lower part of frame forms sump for lubricating oil.

Options -
 Explosion relief device (Bicera Relief Valve)
 Frame liquid level controller
 Temperature control valve
 Dry sump configuration
 Lifting lugs (Standard on Export only)

- 2.0 Crankshaft Configuration - Forged, alloy-steel crankshaft with passages for pressure lubrication. One-piece construction. Two and four throw have counterweights.
- 3.0 Connecting Rod Configuration - Forged, alloy-steel 2 piece construction, I-beam sections, rifle drilled passages for pressurized oil lubrication to crosshead and crosshead guide. Two bolt configuration.
- 4.0 Crosshead and Crosshead Pin Configuration - Standard style crosshead is a nodular iron box type with babbitted running surfaces. Crosshead pin is full floating type, secured in place by cap pin and bolt. Where required, positive-lock disc-type weights are bolted to crosshead for balancing within two pounds maximum.
- 5.0 Distance Piece - Cast iron one piece design, 13.00" long, 18.00" long on high pressure (MAWP > 2000 psig) 8.00" cylinders and smaller, sealed to 25 psig. Gasketed solid covers on both sides. Stainless steel fittings with either stainless steel braided hose, tubing or a combination thereof. Inside painted with oil proof white primer paint. Cast iron wiper rings and Teflon sealing rings.
 - Options - Cast iron one piece design, 18.00" long, sealed to 25 psig. Gasketed solid covers on both sides. Required on high pressure cylinders (MAWP > 2750). Also required on 8.00" cast iron bore and smaller if an oil slinger is required.
 - Cast iron one piece design, 18.00" long, sealed to 25 psig. Gasketed solid covers on both sides. Distance piece can be provided with purged wiper assembly and purged packing. 22.00" long distance piece is required on high pressure cylinders (MAWP > 2750) and on 8.00" bores and smaller, when using purged wiper and packing..
 - Cast iron two piece design, 26.00" long sealed to 25 psig. Consists of 1 - 8.00" on frame end and 1 - 18.00" on cylinder end. Stainless steel braided hose, tubing or combination thereof are standard in 18.00" distance piece only. Partition packing is non-lubricated with three pairs of double acting tangent cut rings - glass and graphite-filled PTFE.
- 6.0 Bearings and Bushings -
 - 6.1 Frame Main - Horizontally - split, aluminum alloy with pressure lubricated main bearings.
 - Options - Temperature detection system (RTD or "K" type thermocouple) for main bearings, including tubing fittings, brackets and bolting. Terminal connection at frame.

- 6.2 Connecting Rod -
 - Crankpin Bearing - Two piece, tri-metal precision bearing.
 - Connecting Rod Bushing - One piece, solid, steel backed bronze bushing, interference fit, shrunk into place.
- 6.3 Frame Thrust Bearing - Two piece high-leaded tin bronze thrust shoe.
- 7.0 Frame Lubrication
 - 7.1 Oil Pump - Positive displacement, internally mounted, direct driven off end of crankshaft by dowel and hub arrangement complete with pressure relief valve for cold start protection and main bearing pressure regulating valve.
 - 7.2 Oil Filter - Oil filter is frame full-flow and uses a single coreless disposable type element. The core post is integral to the housing. The filter comes with 0-30 psig, frame mounted liquid filled differential pressure gauge. External oil piping downstream of the filter is 316/316L Stainless Steel.
 - Filter Rating: B[15] ≥ 200 (Minimum Particle Removal Efficiency of 99.5% for 15 micron particles) in accordance with ISO 16889
 - Cartridge Collapse Rating: 150 psig
 - Options -
 - Dual oil filter with transfer valve. (Shipped loose).
 - Stainless steel piping upstream of standard filter.
 - 7.3 Oil Cooler - Fixed bundle shell and tube watercooled oil cooler. Steel shell (housing), carbon steel tube sheets welded to shell, 4 pass design with cast iron bonnets, seamless admiralty tubes 25 BWG, 3/8". Oil in shell. (Shipped loose).
 - Option - Tema C
 - 7.4 Prelube Pump (Option) - Hand operated, frame mounted, positive displacement pump.
 - 7.5 Frame Oil Heater (Option) - Immersion oil heaters available for all frame sizes. Watt density is 15W/sqin. Standard is 440/480 volt, 3 phase.
- 8.0 Crankshaft Seal Assembly - Prevents oil leakage from frame, non-pressure containing design. Consists of a weather seal pressed into frame end cover around crankshaft. On 2 and 4 throw frames, the crankshaft counterweight inboard of seal acts as a slinger throwing oil back into frame. On 6 throw frames, there is a split slinger ring clamped on crankshaft inboard of oil seal for this same purpose.
- 9.0 Tool Kit - Consisting of crosshead nut wrench, piston rod entering sleeve and piston nut adapter (if applicable). One set provided per frame.

10.0 Paint -

All castings are shot blast, chipped and cleaned. Internal surfaces of frame, frame extensions and distance pieces are painted with an oil-proof white primer. All external surfaces are painted with a red oxide primer.

11.0 Preservation for Shipment -

Lubricated Cylinder Applications - For domestic (North America) applications, all internal components within the cylinder and frame are coated with a rust preventative light oil. For overseas shipment or extended storage (6+ months), the compressor frame and cylinder internals are coated with a heavy oil. Critical components within the cylinder such as piston and rods and valves are removed and boxed separately for better preservation. It is recommended that most of the heavy preservative be removed prior to start-up. **Special Note:** If the compressor is a domestic shipment, but the package is export, and the packager will be run testing the package in house, it is then up to the packager to insure overseas preservation measures are taken on the compressor prior to overseas shipment.

Non-Lube Cylinder Applications - For domestic (North America) applications, aluminum paint is used in the cylinder gas passageway and heads as a corrosion preventative. On export shipments or extended storage, the gas passages and heads will be sprayed with a mineral rust preventative after the aluminum paint is applied. Pressure, partition packing and oil wiper rings are removed and placed into a greaseproof, waterproof, flexible barrier material followed by an outerwrap. Export or extended storage also require the piston and rod assembly to be removed for shipment. Piston and rider rings are to be removed and packed like the packing rings mentioned earlier. Piston and rod are sprayed with a fingerprint neutralizer, then the piston, rod and jamnut are sprayed with a rust preventative and finally wrapped like the packing rings mentioned above.

12.0 Quality Assurance -

All major components are visually and dimensionally inspected and their material content reviewed for compliance. Procedures are per Siemens Energy Standard manufacturing specifications (See GFP28). Any records generated as a result are maintained at the factory.

Compressor -	Running clearances and balancing checked and verified. Bar-over and rod run out. 1 hour no-load mechanical run test. Documentation provided: QAF-262 (assembly / test record).
Frame -	Chemical and physical. Leak tested. Documentation provided: None
Crankshaft -	Chemical, physical, magnetic particle and ultra-sonic. Documentation provided: None
Connecting Rod –	Chemical and physical. Documentation provided: None
Connecting Rod Bolts -	Chemical, physical and magnetic particle. Documentation provided: None
Crossheads -	Chemical and physical. Documentation provided: None
Crosshead Pins -	Chemical, physical and magnetic particle. Documentation provided: None
Distance Pieces -	Chemical and physical. Documentation provided: None

NOTE: Additional dollars are required for the following (see pricing pages):

- QA/QC requirements outside the standard plan.
- Supplying documentation that normally isn't provided.
- Witnessing any tests or inspection points.

C. Component Specification

1.0 Connecting Rod Assembly

1.1 Connecting Rod	
- Length (in.)	16.00
1.2 Bearing	
- Diameter (in.)	7.00
- Length (actual surface in.)	2.47
- Proj. Area (sq. in.) (LxD)	17.29
- Bearing Pressure at MARL (psi)	3470
1.3 Bushing	
- Diameter (in.)	4.25
- Length (actual surface in.)	3.897
- Proj. Area (sq. in.) (LxD)	16.56
- Bearing Pressure at MARL (psi)	3623

1.4	Bolting	
	- Thread Size	1.625-12UNJS
	- Stretch Required (in.)	.018-.020
2.0	Crosshead Assembly	
2.1	Crosshead	
	- Diameter (in.)	13.00
	- Piston Rod Thread Size	2.50-8 UNJ
	- Piston Rod Root Stress (psi) (MARL/Tensile Stress Area)	14,000
2.2	Crosshead Running Surface	
	- Length (actual surface in.)	9.57
	- Proj. Surface Width (in.)	6.19
	- Proj. Bearing Area (sq. in.) (LxW)	59.24
	- Maximum Bearing Pressure at MARL (psi)	190
2.3	Crosshead Pin Bolt	
	- Thread Size	.750-10UNC
	- Torque (ft-lbs)	100 - 110
3.0	Frame Assembly	
3.1	Main Bearing - Shell	
	- Diameter (in.)	7.00
	- Length (actual surface in.)	3.22
	- Proj. Area (sq. in.) (LxD)	22.54
	- Bearing Pressure at MARL (psi)	2662
3.2	Main Bearing Cap Bolt	
	- Thread Size	1.00" - 8 UNC
	- Torque (ft-lbs)	400 - 420
3.3	Frame Tie Rod Nut	
	- Thread Size	1.500 - 8 UN-3B
4.0	Lubrication System	2/4/6
4.1	Frame & Running Gear	
	- Crankcase Capacity (gal)	21/57/96
	- Pump Capacity at 1000 RPM (gpm)	40/70/110
	- Oil Flow to Cooler (gpm)	23/46/69
	- Oil Flow to Filter (gpm)	23/46/69
	- Oil Temperature (°F)	
	- Normal	150 - 170
	- Maximum	180
	- Oil Pressure (psig)	
	- Normal	55-60
	- Minimum	40
	- Shutdown Setting	35
	- Oil Cooler	
	- Type	Shell and Tube

4.2 Cylinder (Divider Block System Standard w/Pressures >3000 psig)	
- Oil Source	Frame
- No. of pumps provided	1/2/3
- No. of Usable Pump Locations	2-4
- Maximum Output/(1/4") Pump at 1200 RPM (PPD)	20
- Maximum Pressure (psi)	3500
Options:	
- Distribution System	Pump-To-Point
- Oil Source	Internal or External
- No. of Pumps	As Required
- Maximum Pressure (psi)	6000
-Electric Motor Driven Lubrication System (Shipped Loose)	

D. Materials of Construction of Major Frame Components

COMPONENT	MATERIAL	CODES/STANDARDS (TYPICAL)
Bearing Caps	Gray Cast Iron	ASTM A48 Class 30
Bearing, Crankpin	Tri-metal	SAE 1010, 49
Bearings, Main	Aluminum	SAE 770
Bolts, Bearing Caps	Alloy Steel Forging	ASTM A193 Grade B7
Bolts, Conn Rod	Alloy Steel Forging	ASTM A193 Grade B7
Bolts, X-HD Pin	Calcium-Aluminum Treated Alloy Steel	ASTM A193 Grade B7
Bushing, Conn Rod	Tri-metal	SAE 1026, 792 or 797
Bushing, X-HD Pin	Tri-metal	SAE 1010, 792 or 797
Capscrews, Covers	Carbon Steel	ASTM A307 Grade B
Connecting Rod	Alloy Steel Forging	ASTM A370; AISI 4142
Covers, Extensions	Carbon Steel Plate	ASTM A285 Grade C
Covers, Oil Ring	Carbon Steel Plate	ASTM A285 Grade C
Covers, Top	Carbon Steel Plate	ASTM A285 Grade C
Crankshaft (6" Stroke)	Forged Steel	AISI 4140
Crankshaft (7" Stroke)	Forged Steel	AISI 4340
Crosshead	Nodular Iron Casting	ASTM A536 Grade 65-45-12
Distance Piece	Gray Cast Iron	ASTM A48 Class 30
Frame	Gray Cast Iron	ASTM A48 Class 30
Pin, Crosshead	Calcium-Aluminum Treated Alloy Steel	ASTM A193 Grade B7
Rings, Oil Wipers	Cast Iron	---
Spacer, Tie Rod	Gray Cast Iron	ASTM A48 Class 25
Tie Rod	Calcium-Aluminum Treated Alloy Steel	ASTM A193 Grade B7