

TECHNICAL BRIEFS

Latest engineering developments for busy power men

10 Digests for you on:

HYDRO POWER
PUMPS
GAS TURBINES

HIGHEST HEAD AND LARGEST HYDRAULIC TURBINES BUILT IN EUROPE

Highest-head pelton turbines					Highest-head kaplan turbines				
Plant name	Location	Head, ft	Output, hp	Speed, rpm	Manufacturer	Plant Name	Location	Head, ft	Output, hp
Reiseck	Austria	3800	31,000	750	Charmilles	Bort-Rhue*	France	230	31,800
Ditence	Switz.	5700	50,000	500	Charmilles	Bacis	Italy	190	13,600
Merville	Switz.	4750	47,800	500	Charmilles	Requijada	Spain	188	5,730
Portillon	France	4180	55,600	500	Charmilles with Alatham-Charmilles	Rochetta	Italy	184	5,000
Pragieron	France	3920	100,000	428	Neyrpic	Invergarry*	Scotland	177	26,000
Pianto Netto	Italy	3920	14,700	600	Riva	Pollaphuca	Ireland	165	25,000
La Bathie	France	3820	96,400	428	Neyrpic	Lissa*	Sweden	130	105,650
Highest-head francis turbines					High-powered hydraulic turbines				
Fionnay*	Switz.	1490	63,300	750	Echer Wym	Bort Les Orgues	France	336	134,000 P
Limbeg	Austria	1420	77,700	300	Echer Wym	Chastang	France	323	125,000 P
Vindbra	Norway	1366	66,000	300	Kvaerner Brug	Harnepang	Sweden	344	123,200 P
Flatsome	Italy	1320	70,148	1,000	Echer Wym	Sungari	Manchuria	326	115,500 P
Hol	Norway	1268	60,000	300	Kvaerner Brug	Kilborn	Sweden	312	112,730 P
Kaprun*	Austria	1243	71,000	300	Echer Wym	Lissa*	Sweden	130	105,650 K
Bitto	Italy	1315	14,615	1,100	Echer Wym	Pragieron	France	3920	100,000 P
Roduno	Austria	1130	64,100	300	Echer Wym				

* Under construction; P, francis; K, kaplan; P, pelton

Hydro Power

Modern Trends in Hydraulic Turbine Design in Europe. By George A. Roubi, Charmilles Engineering Works, Geneva, Switzerland.

Modern trends in hydraulic-turbine design in Europe are described, especially how they differ from American practice. Even though there has been no major inventions in hydraulic turbines during the last 20 years, many outstanding units have been built in Europe for exceptionally high heads and of large sizes, as shown in the tables above. These tables are picked from extensive ones given in the paper.

The highest head pelton turbines will be in the Reiseck plant in Austria, rated 31,000 hp under a 5800-ft head. This is more than double the highest head used in the U.S. For francis type the 63,200-hp units in Fionnay plant in Switzerland will have the highest head, 1490 ft. The 230-ft head of the 31,800 Bort-Rhue kaplan units in France is more than double the highest head used on turbines of this type in this country. The Bort les Orgues in France has the largest francis turbines in Europe, 154,000 hp. Design capacity of these units is about the same as for the Grand Coulee units in this country, but the latter operates continuously loaded to 170,000 hp. ASME paper No. 52-A-92.

Pumps

Mechanical Pumps for High-Temperature Liquid Metals. By Philip M. Clark, Knolls Atomic Power Laboratory, General Electric Co.

As a part of the development of nuclear power for submarine propulsion the General Electric Co. designed and built a relatively large heat-transfer test system in which liquid sodium and liquid sodium-potassium were used as heat transfer media.

For this system it was necessary to develop a pump that could circulate about 400 gpm of liquid metal at temperatures up to 750 F, without leakage at the shaft. But, a small gas leakage could exist. Two identical centrifugal pumps were built and have operated successfully for several thousand hours. A description of the pump design, associated seal development and operating experience are presented in this paper.

Detailed designs of the two pumps were developed in cooperation with the Buffalo Pump Co., where the two pumps were built. Each pump is a single volute, radial centrifugal design with a 926 specific speed and rated 400 gpm, 126 ft head at 1750 rpm. The pumping elements are contained in a large drain tank filled with inert gas under pressure, while the supporting bearing and 20-hp, motor are above the floor plate.

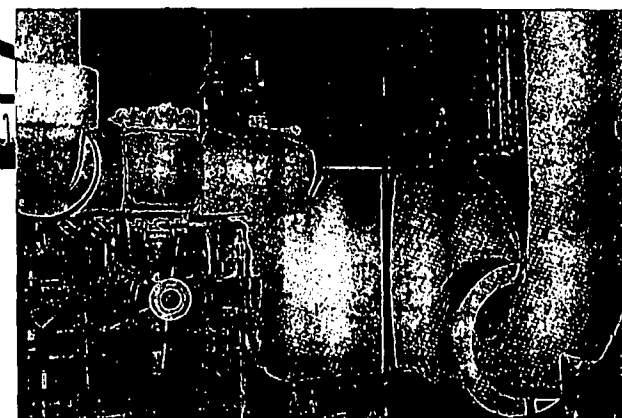
Sealing the pump against leakage, one of the difficult problems that had to be solved. Different types of pumps were tried, but without complete success, when the development switched to rotary seals. To keep leakage down to less than 0.1 cu in/hr both carbon and wear rings were lapped to less than three light bands and in most cases to less than 0.001 in. Minute quantities of lubricant increase seal life to more than 2000 hr. ASME paper No. 52-A-94.

Development of Special Pumps, Power Supply, Valves, Bearings, Instrumentation for Liquid Metals. By Edward F. Brill, Alfa-Chalmers Mfg. Co.

When planning and designing power plants the pumps or blowers circulating coolants through the reactors to transfer heat to a power or heat sink require special attention. They must circulate the coolant without failure, leakage or require maintenance for long periods. The paper discusses the several types of these pumps that have been developed and the use of leakless pumps for high pressure temperatures.

Among the pumps are the hermetically sealed designs of which three types have been built. They are the only

For this new addition to their New York City power plant at East River and 14th Street...



View of recently completed addition to Consolidated Edison power plant... another of their gigantic expansion program. (Right) Close-up of J-M 85% Magnesia insulation on boiler. It was expertly installed by the Asbestos Construction Company, Inc., an outstanding Insulation Contractor.

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